Duck Hunter Preferences for Season Dates and Opinions about a Task Force Approach to Setting Season Dates in New York

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EXECUTIVE SUMMARY

Waterfowl management in the U.S. involves a combination of federal and state management decisions made annually based on information about various waterfowl populations, habitat conditions, along with stakeholder opinions and preferences. Annually, federal regulations pertaining to season length and daily bag limit are promulgated based on estimates of habitat conditions, breeding success, and the previous year's harvest. In all four Flyways, each state determines the dates when the hunting season will be open and closed, and whether there will be a straight or a split season. Each state also has the option to manage waterfowl based on a system of zones.

The New York State Department of Environmental Conservation (DEC) provides hunting opportunities in five zones: Western, Northeastern, Southeastern, Long Island, and Lake Champlain. Starting in 1997, DEC has used Task Forces comprised of hunter representatives to recommend duck hunting season dates in the Western, Northeastern, and Southeastern zones – areas of the state where hunter preferences usually vary the most. The purposes of this study were: (1) to obtain information from active duck hunters in the various zones when hunting opportunities should be available to them, and to understand the reasons underlying season date preferences, and (2) evaluate the concept of using task forces to identify season dates.

STUDY OBJECTIVES

1. Determine duck hunters' preferences for season opening and closing dates within Western, Northeastern, Southeastern, and Long Island waterfowl management zones.

2. Identify the assumed benefits and limitations hunters associate with their preferences.

3. Assess hunters' opinions about the most appropriate characteristics for a Task Force approach to season setting.

Conceptual Foundation for Understanding and Describing Hunters' Assumptions About How Different Season Dates May Affect Their Experiences

We used an Adaptive Impact Management (AIM) approach to design this study of hunters' reasons for preferences about season dates, and as a foundation for members of hunter task forces to interpret the findings when deciding when the season should occur. The main premise of an AIM approach is that hunters recognize, and value very highly or despise greatly, some of the effects of their interactions with ducks in the field and with other hunters. Highly-valued effects are positive impacts to be managed at desirable levels, whereas highly-despised effects are negative impacts to be managed at tolerable levels. Further, these impacts can be thought of as the fundamental objectives of waterfowl management.

Because maximum, long-term harvest is the explicit objective on which decisions are based about federal harvest regulations, we developed a conceptual model of interactions between hunters in the field and ducks in an area that necessarily occur prior to, and including, harvest: seeing ducks, seeing ducks-in-range, shooting at ducks seen in-range, and harvesting ducks. The model also acknowledged that none of these interactions is possible in the absence of hunters' intentions to go afield, and that the harvest-related interactions (i.e., shooting at ducks and harvesting them) occur only when hunters' intentions to shoot are sufficiently high. Finally, the model acknowledged that

some of the effects of hunter-hunter interactions in the field can have dynamic feedback on hunter-duck interactions (e.g., seeing ducks, seeing ducks in-range) or on hunters' intentions (e.g., to shoot at a duck they normally would not shoot at, or even whether to go hunting). Based on this conceptual model, we identified several possible reasons why hunters might prefer to have the hunting season open at various times during the fall and winter, in terms of factors that might influence various interactions in the model.

METHODS

We used a mail survey to obtain data about duck hunters' preferences for season dates and opinions about using a Hunter Task Force approach for setting season dates in the various waterfowl management zones in New York State. A total sample of 3,600 duck hunters was stratified among the four largest zones (i.e., Long Island [n = 900], Southeastern [n = 1,000], Northeastern [n = 850], and Western [n = 850]). We implemented the survey on 3 October 2005 following Dilman's (2000) four-wave procedure.

RESULTS

Characteristics and Duck-hunting Experiences of Respondents

The overall response rate was 54%, with 396 to 546 useable responses from each of the 4 management zones. Due to the high number of useable responses per zone, and previous research showing that nonrespondents generally have less interest in the study topic, we did not assess whether there was any nonresponse bias. Most respondents were male (98%), fairly well-educated (69% had completed at least some college), and lived in non-urban areas.

Respondents expressed a range of avidity (i.e., importance) toward duck hunting statewide. Overall, about one-half said their interest in duck hunting had not changed over the previous five years, and three-quarters of the rest said their interest had increased. In general, less-avid hunters were more likely to express decreasing interest in duck hunting. Similar patterns of avidity and interest were found in all four zones. One-quarter of respondents started duck hunting between 1997 and 2004, and one-quarter started prior to 1970. Most were consistent hunters, as three-quarters had hunted ducks in each of the previous five years. Overall, 95% intended to hunt ducks during the up-coming 2005 season.

Statewide, about one-half of respondents hunted primarily for dabbling ducks, 29% for geese, 4% for diving ducks, and the remainder were generalists. Compared to hunters in other zones, more Long Island hunters were primarily "diving duck hunters" or "generalists," but fewer were "goose hunters." Hunters from the Northeastern and Southeastern zones were most likely to hunt primarily for dabbling ducks, and hunters from the Western Zone were most likely to be primarily "goose hunters."

Statewide, about one-half of hunters primarily hunted in shallow water, with the remainder fairly evenly split among "deep water hunters," "field hunters," and "habitat generalists." Compared to hunters from the other zones, more Long Island hunters but fewer Western Zone hunters primarily hunted in shallow water. Southeastern and Western zone hunters were about twice as likely as hunters in the other zones to be classified as "field hunters." Statewide, many accessed primarily "private land for free" (45%) or "public land (40%). Over three-quarters of Long Island hunters

primarily accessed "public land," but relatively few accessed "public land for free." Hunters from the Northeastern Zone also exhibited these patterns, but on a much lesser scale than Long Island hunters.

Statewide, duck hunters averaged 11.4 days of hunting during the 2004-05 season (ranging from 9.6 days for those hunting in the Southeastern Zone to 14.0 days for those hunting in the Long Island Zone). They bagged an average of 15.5 ducks during the 2004-05 season (ranging from 12.2 in the Southeastern Zone to 18.1 in the Western Zone). Overall, hunters averaged 1.3 ducks bagged per day of hunting (ranging from 1.0 ducks/day for Long Island hunters to 1.5 ducks/day for Northeastern Zone hunters).

Only 77 out of 1,838 respondents used a commercial waterfowl hunting guide during 2004-05, and most of those were from the Long Island Zone. Those who used guides typically employed them for only a day or two. Overall, participation in the 2004 Youth Waterfowl Hunting Weekend ranged from about 6% of respondents from the Long Island Zone to 14% of respondents from the Western Zone (we do not know in which zone people may have participated).

Preferences for Season Dates

Long Island Zone hunters generally preferred to have a straight season open from about mid-November through the end of January. Northeastern Zone hunters also preferred a straight season, but one that opened as early as possible and closed by mid-December. Southeastern Zone hunters generally preferred the season to be open from early to mid-October into early December. Western Zone hunters generally preferred a split season, with the first split from about mid October to mid November, and the second from late December through mid-January. However, different hunters preferred the earlier dates vs. the later dates. Hunters in all zones indicated very little preference to have the season be open specifically on Thanksgiving or Christmas days.

Overall, the most important reasons why hunters preferred to have the season open during specific weeks during the fall and winter were: "when the most ducks will be around," "when they have the best chance to take favorite kinds of ducks," "when the weather is best for duck hunting," and "when I have time to hunt." Reasons of mid-importance were having goose season open concurrently and possible conflicts with other hunting seasons. Possible reasons of little importance included interference from hunters or from the non-hunting public, and having enough hunters to keep ducks moving around. Reasons underlying preferences for season dates were most complicated in the Western Zone because different groups of respondents preferred to have the duck season open earlier vs. later, yet they gave the same reasons pertaining to duck abundance and when the weather was best for duck hunting.

Hunters' preferences for whether the duck season opens on a non-holiday weekday or on a weekend day differed among zones, with most Long Island hunters preferring a non-holiday weekday, but hunters in other zones generally preferring a weekend opener. Regardless of Zone, the important reason for preferring a weekday opener was "least chance of interference from other hunters." The second most important reason for hunters in all zones was "easier to get access to my favorite spots." Among hunters who preferred a weekend opening day, the most important reason in all zones was "more convenient due to my work schedule." The second most important reason in all zones was "enough other hunters will keep ducks moving around."

Opinions About a Task Force Approach to Recommend Season Dates

Statewide, only a minority of hunters (35%) were aware that DEC has used task forces to recommend season dates in some waterfowl management zones (25% in Long Island Zone, 29% in Southeastern Zone, 38% in Northeastern Zone, and 44% in Western Zone). Among respondents statewide who were aware of the task forces, 66% had never personally provided input to a task force. About one-quarter (23%) of those who were aware of the process had provided information one to three years, 7% had provided input four to six years, and 4% had provided input all seven years the task forces had been used.

Between 32-43% of aware respondents and 33-35% of unaware respondents in all zones supported the use of task forces "to a great extent." About one-half of both aware respondents (52-57% depending on the zone) and unaware respondents (50-56%) supported the use of task forces "to a moderate extent." In each of the zones, $\leq$2% of aware or unaware respondents expressed no support at all for the concept.

Overall, respondents indicated substantial support for inclusion of DEC biologists on the task forces as well as a mix of avid, experienced hunters and those who are less avid and experienced. Rather than basing season dates only on the experience of task force members, respondents wanted to be able to provide input – by attending task force meetings (which likely is not feasible), via e-mail or telephone, or having DEC sponsor scientific surveys. The most important factor that duck hunters in all zones, regardless of avidity, wanted task force members to consider was "when ducks would be most abundant."

DISCUSSION

Preferences for Season Dates Reflect Importance of Hunter-Duck Interactions

In all four major waterfowl management zones, preferences for season dates reflected the interests of hunters in having some positive effects of hunter-duck interactions managed at desirable levels. In particular, hunters preferred to have the duck-hunting season open when they believed they were most likely to see many ducks in general, to have the best chance to take their favorite kinds of ducks, and to have the best weather for hunting ducks. Of lesser importance were reasons linked to duck hunters' decisions about whether to hunt ducks, like potential conflicts with other hunting seasons, or the complementary opportunity to hunt geese simultaneously with ducks. Preferences for opening day to be on a week day were related to hunters' interests in having some negative effects of hunter-hunter interactions managed at tolerable levels.

Hunters' interests revealed in this study differ from the main assumption guiding national and Flyway management decisions: that the objective of waterfowl management is to maximize duck harvest rate over the long-term. Despite this explicit focus on harvest rate as the management objective of waterfowl management, effects of non-harvest interactions long have been documented as being more important than harvest. Preferences for season dates that maximize interactions with total numbers of ducks or specific types of ducks may reflect the universality of enjoying, or "being connected to," nature (i.e., a possible positive impact associated with many interactions with ducks). Preferences for opening the season on a week day similarly may reflect a commonly held desire to minimize "crowding" and other forms of interference from other hunters (i.e., a possible negative impact associated with interactions among hunters).

Verifying or refuting which impacts should be managed is vital to the success of management. Hunters who differ in terms of duck-hunting avidity or commitment, or in use of particular hunting techniques or habitats may identify different impacts to be managed. Thus, various hunters likely will evaluate management success differently based on whether they experience desirable/tolerable levels of impacts they associate with hunter-duck interactions, not simply the magnitude of harvest, per sé.

How Do New York Duck Hunters in 2005 Compare to Duck Hunters in 1990, and Can Data From Our Study be Augmented With Data From a National Duck Hunter Survey?

The characteristics and harvest-related behaviors of "active" New York State duck hunters in 2005 were comparable to "continuous duck hunters" characterized in a statewide study in 1990. Also, characteristics of duck hunters from this study were nearly identical to those from another, independent sample of duck hunters drawn from the same pool (i.e., persons who hunted ducks in New York in 2004) as part of a national duck hunter study also conducted in 2005. The similarities between the two samples of New York duck hunters drawn in 2005 reflect the adequacy of our sampling strategy. The similarities also provide an opportunity for waterfowl biologists to analyze data from New York respondents to the national survey as a supplement to data from this study.

CONCLUSIONS AND IMPLICATIONS

Support for Concept of Using Task Forces is Consistent with an AIM Approach to Decision-making

Because very avid and less avid duck hunters may value a particular interaction or effect for different reasons, identification of impacts to be managed necessarily should be linked to improving understanding of why hunters desire changes (or stability) in particular effects of those interactions. This could be accomplished best in a collaborative environment conducive to social learning among hunters and duck biologists. Social learning occurs in well-facilitated discussions among a group of stakeholders that enhance common knowledge, awareness of issues important to various stakeholders, and understanding about why those issues are important.

In such a situation, ecological knowledge, such as the relative timing of migration and its influence on duck abundance and species diversity, as well as recruitment and mortality rates, may be necessary but insufficient data for the stakeholders to consider. Also needed is an understanding of duck hunters' knowledge systems – what they think they know about interactions between themselves and ducks and with other hunters – that in turn, influence their behaviors and their hunting satisfaction. In this study, support for the use of hunter task forces to recommend dates, along with the desire to have DEC biologists involved in those discussions, provide an excellent opportunity for the needed collaborative learning environment.

The need for clarity is nowhere more evident than in the same reasons given by hunters who prefer early season opportunities and those who prefer late season opportunities. These different groups of hunters both said their preferences were related to "when the most ducks are around." What needs to be clarified is whether the different hunters have different beliefs about when duck abundance is highest, or whether this could be habitat related – perhaps those who prefer earlier time periods hunt in shallower water that freezes earlier and those who prefer the

latter period hunt in deeper water less prone to freeze and where ducks may concentrate later in the season. Another important reason identified by different hunters preferring earlier vs. later seasons was "best chance to take favorite kinds of ducks." What is unknown is whether their favorite ducks reflect different types (dabblers vs. divers) or species (Wood Ducks vs. Widgeon? Or do some hunters really believe their favorite species (e.g., Mallard) is most abundant earlier while others believe the species is most abundant later? Alternatively, do these results reflect weather-related differences in vulnerability of ducks – perhaps many birds are actually in the area early, but are less prone to decoy until later.

An important implication is that depending on which meaning(s) are correct, the kind of ecological and social information Task Force members would need to make the best possible decisions about season dates could differ. These meanings could be explored in detail through a facilitated, social-learning opportunity provided to Task Force members. After some insights are generated through a general discussion, a more directed discussion could lead Task Force members through a set of questions such as those mentioned above. For example, is duck abundance really important, or is it that hunters use duck abundance as an index to the kinds of subsequent interactions. That is, the more ducks that are around increase the odds of seeing ducks and having a chance to shoot them – all other things being equal.

Further, if Task Force members believe that duck abundance actually is most important, discussion then could be focused on what they believe the effects would be on those subsequent interactions under different abundance scenarios (e.g., 5,000 ducks estimated to be in the Zone on a given day vs. 50,000 ducks estimated to be in the Zone on given day). Would any of those interactions change appreciably under those scenarios? If the answer is "it depends on weather, access, types of habitats, techniques, etc., then duck abundance probably is not THE most important factor.

Outcomes of the discussion outlined above could have direct applicability to management decisions. For example, should DEC devote scarce resources to estimating duck abundance by time period over the course of possible hunting season dates? If duck abundance is indeed vitally important, then spending resources to estimate duck abundance by time period would seem warranted. If #2 through #4 are more important (i.e., one of these is the "real" definition of "when the most ducks are around") then resources might be better spent on collecting the kinds of information listed for that question in the table above.

Task Force Members Could Provide Expert Opinion About the Dynamic System of Factors That Influence Impacts to be Managed

An important outcome of facilitated discussions with task force members is an explicit description of ecological and social "sideboards" on the wildlife system being managed. The main purpose of describing a conceptual model is to build a shared understanding of the management system among the stakeholder involved, not to predict or simulate model outcomes. Another benefit of involving stakeholders in development of a mental model of the system to be managed is identification of any variability in stakeholders' (and biologists') assumptions about the system and how it operates to influence levels of impacts.

Because stakeholders typically have a hard time, initially, describing impacts they would like managed, a fruitful approach for the use of preference data by task forces would be to have a trained facilitator start the collaborative learning discussion with a description and "picture" (i.e., mental model) of the set of hunter-duck interactions that must occur for ducks to be harvested. Such a model necessarily would be simplistic, except that it would include main findings from this study about the relationship between reasons underlying preferences for season dates and important hunter-duck interactions from seeing to harvesting ducks.

With a conceptual foundation based on tangible and desirable experiences of duck hunters (i.e., seeing and harvesting ducks), the facilitator then could ask task force members to improve upon the model by identifying missing elements (e.g., hunter-hunter interactions), feedback mechanisms (e.g., effect of shooting intensity on duck observability), and other factors that affect hunters' behavioral choices in terms of their intentions to go duck hunting, or their intentions to shoot at ducks that are in-range. Specifically, task force members could be asked: (1) how would a change in season dates affect the interactions depicted in this model? (2) would any identified change add to, or detract from, your hunting satisfaction?, and (3) why would it influence your satisfaction?

Using a Model Improved by Task Force Members to Identify Impacts to be Managed and Data Collection Needs

Answering the "why" question posed above could help identify specific impacts to be managed. Also, discussing with task force members how a change in season dates might affect the interactions depicted in the model could produce an explicit description of hunters' assumptions about model structure (i.e., the system to be managed). Expert facilitation also could explicitly identify alternative hypotheses about factors that influence important relationships in the model. Subsequent to development of the conceptual models using task forces, scientific surveys could be used to assess current levels of impacts compared with desirable or tolerable levels (e.g., as in the concept of wildlife stakeholder acceptance capacity [Carpenter et al. 2000]).

Engaging Task Force Members Can Help Reduce Uncertainty in Management

A key characteristic of adaptive management is explicit recognition of uncertainty about ecosystem components and their management. This study has been an initial step toward reducing some of these kinds of uncertainty by shedding light on how duck hunters think about the *duck management system*; that is, the system of interactions between themselves and ducks, and among duck hunters in the field. In particular, we gained insights about hunters' perceptions of how season dates might influence interactions among components of that system and thus change the nature and magnitude of some of the important effects of those interactions. Building on the knowledge gained through this study, task forces could be used to further reduce structural uncertainty, focus data collection needs to improve partial observability, and recommend management interventions that reduce uncertainty associated with partial controllability.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Waterfowl management in the U.S. involves a combination of federal and state management decisions made annually based on information about various waterfowl populations, habitat conditions, along with stakeholder opinions and preferences (http://migratorybirds.fws.gov/mgmt/AHM/AHM-intro.htm). At the national level, the decision-making process is aggregated geographically into four Flyways, with New York State occurring within the Atlantic Flyway. In each Flyway, a Flyway Council of state agency administrators, waterfowl biologists from the respective states, and the U.S. Fish and Wildlife Service (USFWS) work together annually to propose waterfowl hunting regulations, which then are subject to extensive public review (Johnson and Williams 1999). Each year by early fall, USFWS publicizes a regulatory framework within which the various states set state-specific regulations.

Each state in a Flyway has the option to manage waterfowl based on a system of zones. For each zone, state waterfowl managers set season starting and ending dates and daily bag limits, within the Flyway-wide framework. The New York State Department of Environmental Conservation (DEC) manages waterfowl in five zones (Figure 1): Western, Northeastern, Southeastern, Long Island, and Lake Champlain. Starting in 1997, DEC has used a Task Force comprised of hunter representatives to recommend duck hunting season dates in the Western Zone. Task Forces then were phased-in over time in the Southeastern and Northeastern zones. Together, these 3 zones are areas where hunter preferences had varied the most over the years. According to information on DEC's web site (http://www.dec.state.ny.us/website/dfwmr/wildlife/guide/miggbinput.html):

> These task forces have helped DEC establish season dates that provide equitable duck hunting opportunities for the various interests in each zone. Each task force includes representatives from the New York State Conservation Council (NYSCC), established waterfowl hunting organizations, and individual waterfowl hunters who were chosen to provide a broad range of input. Task force members act as representatives of all duck hunters in each zone, and they meet in spring to recommend a season for the coming year that best satisfies the diverse interests.

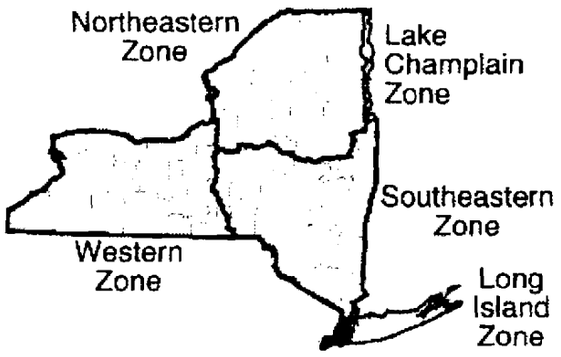


Figure 1. Waterfowl hunting zones in New York State as of 2005 from http://www.dec.state.ny.us/website/dfwmr/wildlife/guide/wfzones.html).

As of 2005, task forces have not been used in the other two zones. Instead, DEC's season-setting team establishes season dates for the Long Island Zone based on hunter input accumulated over several years. Seasons in the Lake Champlain Zone are set by the Vermont Fish and Wildlife Management Board, with consultation from DEC and input from hunters in New York and Vermont, including periodic surveys (e.g., Brown and Enck 2004).

Regardless of whether season dates are set by Task Forces or by DEC staff, information is needed about preferences for dates within the population of duck hunters across the state and within each zone. When hunters indicate their preferences for one alternative over another for any kind of hunting regulation (e.g., preference for opening date during the first, second, third, or fourth week in October), they invariably make assumptions about the benefits of their preferred alternative compared to other alternatives. They also may make assumptions about the limitations or negative aspects of the other, less-preferred alternatives. Improving understanding of hunters' preferences necessitates identifying and validating these various assumptions. Also, needed is to learn how these assumptions are related to the interactions hunters have with ducks and with each other in the course of their hunting activities. Combined, these types of information will provide DEC waterfowl biologists and Task Force members with the basis for making the best possible decisions about which season-date alternatives to enact. Additionally, such information will improve understanding by both federal and state waterfowl managers about the likely influence of that management action on duck harvest and hunter satisfaction.

Thus, DEC has particular need for two kinds of human dimensions data to inform decisions made within the regulation-setting process. One is information about hunters' preferences for season dates and insights about hunters' assumptions about the benefits and limitations that underlie their preferences for particular alternatives. **Of greatest value here is a way of describing those assumptions so that a rationale can be developed for why particular season dates have been recommended in each zone.** The second is an evaluation of the concept of using a Task Force approach to set season dates. Of particular interest here are hunters' opinions about the appropriate representatives to participate in the Task Forces, kinds of information to be used to make decisions and how that information should be communicated from individual hunters to Task Force members, and what information about the decision made and how it should be communicated to the broader community of duck hunters.

Conceptual Foundation For Understanding And Describing Hunters' Assumptions About How Different Season Dates May Affect Their Experiences

A useful foundation for understanding and describing hunters' assumptions about how different season dates may affect their duck-hunting experiences is the concept of Adaptive Impact Management (AIM) first described by Riley et al. (2002) and applied to a waterfowl management example by Enck et al. (2006) (Figure 2). The basic premise of AIM is that, "...the essence of wildlife management is a focus on the positive and negative impacts of wildlife with respect to people (i.e., human values)" (Riley et al. 2002:591). Impacts are formally defined as those effects that stakeholders (1) recognize and (2) greatly desire (i.e., positive impacts) or greatly despise (i.e., negative impacts), and knowledge of these is vital for identifying the objectives of management.

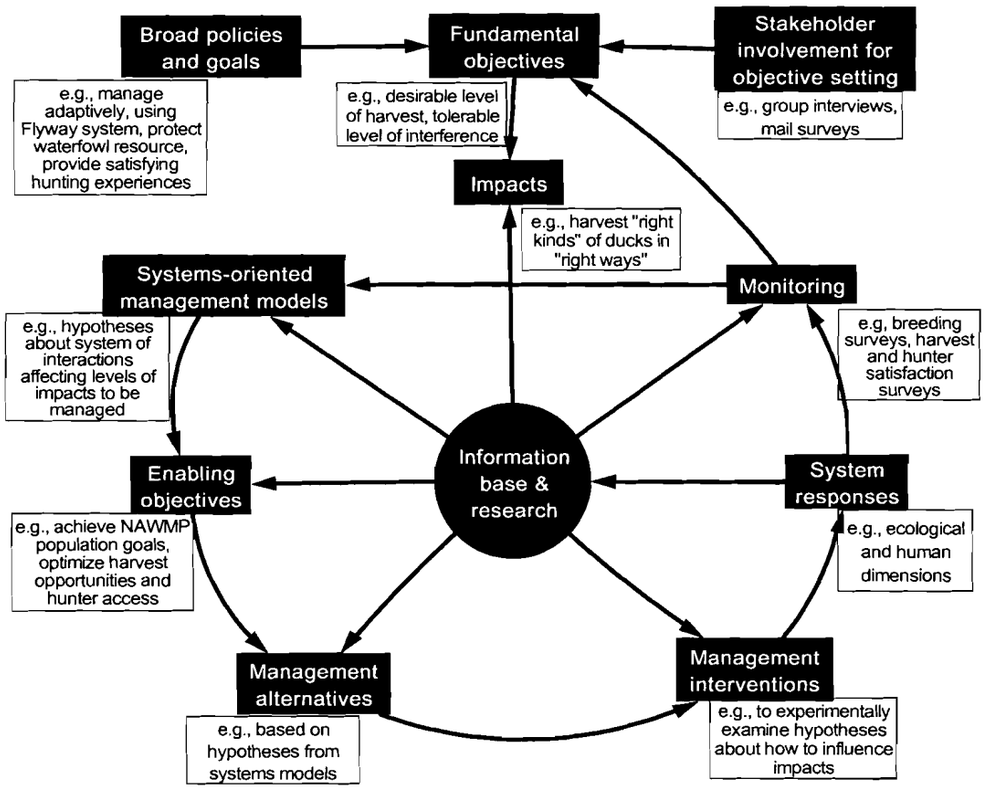


Figure 2. Cyclical, iterative model of decision-making in the context of waterfowl management, showing examples for each major component (from Enck et al. 2006).

As noted by Riley et al. (2003:88), management success depends on differentiating two kinds of objectives (refer to Figure 2): (1) *fundamental*, which "...characterize the reason for management in terms of desired impacts," and (2) *enabling*, which "...describe[e] how the fundamental objectives will be achieved." Since the mid-1990s, the stated objective of waterfowl management at the national level has been to achieve a maximum, long-term harvest of ducks (Williams and Johnson 1995). The choice of this enabling objective has emerged loosely from several broad goals, including sustaining hunter satisfaction and participation, and ensuring continued financial and political support for wetland and waterfowl management (Case 2004). Further, the desire to achieve this enabling objective is based on the explicit assumption that un-described fundamental objectives of importance to duck hunters also will be achieved (Johnson 2001).

This assumption highlights one of the main premises of AIM – that the purpose of management action is to meet the interests and address the concerns of stakeholders. Perhaps nowhere is this more true than in the context of setting season dates for duck hunting. The federal framework of season length and daily bag limit is chosen to ensure the long-term sustainability of duck populations (Johnson and Williams 1999). The selection of season dates (i.e., when hunters can legally pursue ducks) generally is directed at providing the greatest recreational opportunity, with the greatest benefits for most hunters.

An AIM approach can be used to reduce uncertainty about which hunting-related benefits (i.e., impacts) duck hunters want, and can improve understanding of how those benefits might change under different season dates. In other words, an AIM approach can identify the fundamental objectives of management from the perspective of duck hunters. At the same time, it can uncover the set of ecological and social factors that influence the levels of variables specified in those objectives so that a rationale can be described for why certain season dates were chosen over others.

Relating Enabling and Fundamental Objectives to Hunter Preferences for Alternative Management Actions:

When duck hunters state preferences for a management alternative (e.g., when the season should be open), they necessarily have particular reasons in mind. If not, they would be ambivalent and would not be able to state a preference. An important question to consider is this: to what degree are those reasons related to the enabling objective of maximizing harvest vs. some other, unarticulated, and more fundamental objectives? In other words, are hunters' preferences based on trying to optimize the system of interactions between ducks, themselves, and other hunters that will lead to them harvesting the greatest number of ducks every time they hunt, or do they prefer season dates they believe will "optimize" that system of interactions to achieve some other desirable or tolerable impact(s) of importance to them?

The AIM approach provides a useful first step for exploring this question through development of a conceptual model of the "system" of interactions that occur between hunters and ducks, and among hunters, that lead to and influence harvest. From this model, decision-makers can develop testable hypotheses about how the "system" might be influenced if the season was open or closed during particular times (e.g., weeks during fall migration). Modeling is integral to decision-making by federal waterfowl scientists although their rather sophisticated model (Williams 1997, Johnson 2001) includes only *ecological* "states and processes" of the system (Figure 3). Ecological states are variables that can be counted or estimated (e.g., duck population, duck harvest, number of ponds in major breeding range). Ecological processes are effects of interactions between ecosystem states (e.g., natality rate, harvest rate).

A hall mark of the model used by federal scientists is inclusion of hypotheses about 2 particular effects of interactions. First, is the effect on breeding of the interaction between ducks and their habitat (i.e., the number of ponds in the prairie pothole region) density-dependent or not? Second, is the effect on the duck population of the interaction between ducks and hunters (i.e., harvest mortality) additive or compensatory? The inclusion of these hypotheses provides explicit guidance about the types and nature of ecological data that are needed to examine those hypotheses, and to learn about how other components of the model (including the objective variable) are affected by whatever management action (i.e., regulatory package) is enacted.

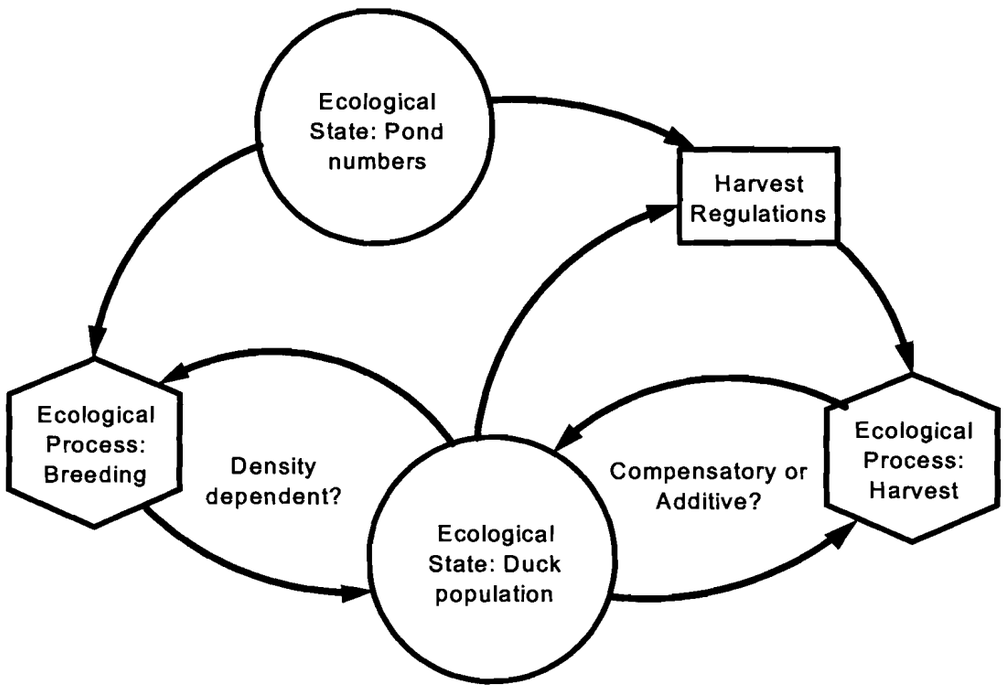


Figure 3. Conceptual model underlying decision-making about federal regulations for waterfowl management, showing that choice of harvest regulations (rectangle) influence a dynamic system of interactions between ecosystem states (circles) and the processes (hexagons) affected by those interactions. Adapted from Williams (1997).

Enck and Ringleman (2006) expanded on the *ecological dimensions* of the model underlying decision-making about federal regulatory alternatives to include *human dimensions* reflecting hunter-duck and hunter-hunter interactions. The same idea applies to state-level decisions about season dates. For duck harvest to occur, a series of sequential interactions between ducks and hunters must happen beginning with hunters seeing ducks/flocks (Figure 4). Some of those ducks/flocks must be in-range, hunters must shoot at some of those in-range ducks, and must harvest some of those ducks when shots are fired. One explicit effect of this sequence of interactions is that the initial number of ducks in the area will be reduced by the number of ducks harvested.

Timing of the hunting season (i.e., season dates) could influence this sequence of hunter-duck interactions in several ways. First, duck abundance and diversity likely would differ depending on when the season was open relative to fall migration. Second, assuming hunters' preferences for season dates reflect their intention to hunt, timing of the season could influence the number of hunters afield. How much influence is unknown, however, because some proportion of hunters undoubtedly hunt even when the season is open when they least prefer. See Appendix B for a more detailed discussion of how season dates could influence hunter-duck interactions.

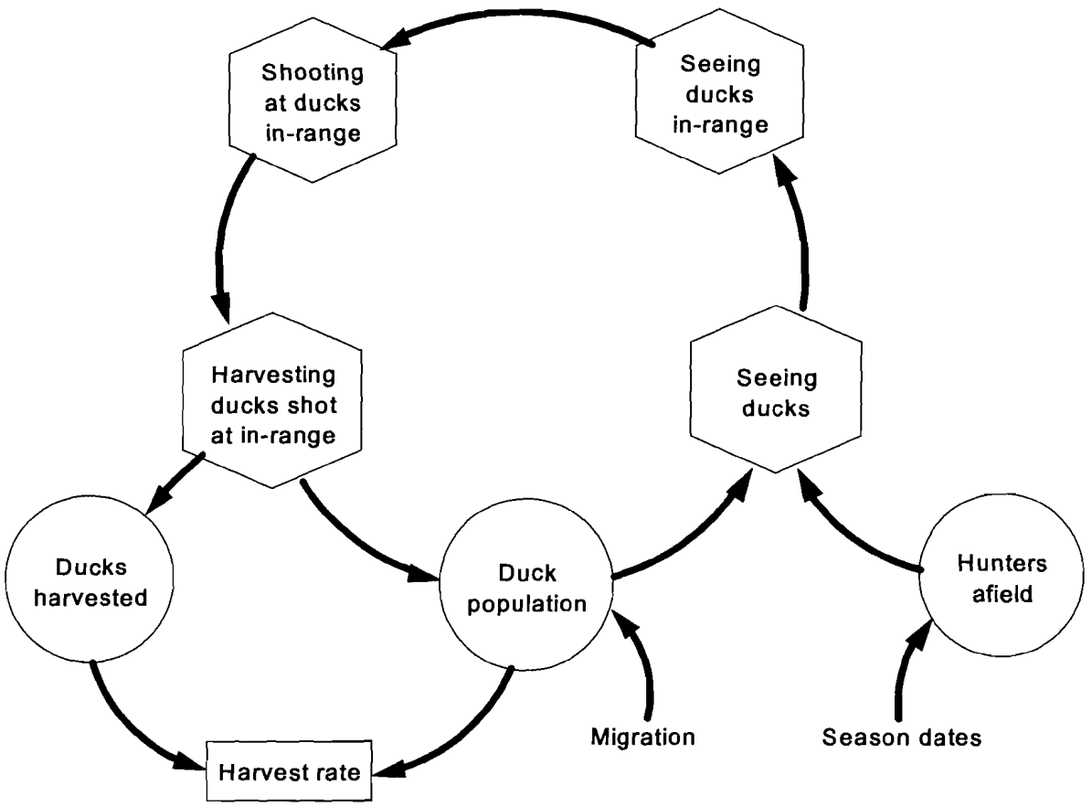


Figure 4. Conceptual model of a dynamic system with ecological and human dimensions, showing that duck harvest results from a sequential series of interactions between hunters and ducks. Adapted from Enck and Ringleman (2006).

A conceptual model, developed with hunter input as part of an AIM approach, would document hunters' assumptions about how different season dates theoretically would influence impacts of importance to them. Identification of those impacts is beyond the scope of this study. However, our examination of the reasons underlying preferences for season dates can provide a starting point for discussions between waterfowl managers and hunters that could lead to clarification of fundamental objectives to be quantified, measured, and achieved. Because duck hunters never have been asked to do this, they likely have only "fuzzy conceptions" about how to articulate impacts and about how those impacts might (hypothetically) be influenced by changing (e.g., through hunting regulations) the dynamic system of interactions between themselves, ducks, and other hunters.

Study Objectives

1. Determine duck hunters' preferences for when the duck-hunting season should be open within the Western, Northeastern, Southeastern, and Long Island waterfowl management zones.

2. Identify the reasons (i.e., assumed benefits and limitations) hunters associate with their preferences.

3. Assess hunters' opinions about the most appropriate characteristics for a Task Force approach to setting duck-hunting season dates.

METHODS

Sampling Considerations and Survey Development

We conducted a mail survey of 3,600 duck hunters (out of ~30,000 in the state) to assess preferences for season dates and opinions about using a Hunter Task Force approach for setting season dates in the various waterfowl management zones in New York State. We stratified the sample among the four largest zones (i.e., Long Island [n = 900], Southeastern [n = 1,000], Northeastern [n = 850], and Western [n = 850]) using three criteria: (1) a desire to obtain 400 useable responses from each zone to provide precise and reliable zone-specific findings; (2) prior-years' license purchases indicating differential populations of hunters in each zone; and (3) typically lower response rates from hunters in southeastern New York and the New York City metropolitan area (i.e., Long Island Zone) compared to other zones. We obtained names and addresses of persons living in the target zones and who hunted ducks during the 2004 waterfowl seasons from DEC. Thus, the sample contained persons we considered to be active duck hunters.

The mail survey was implemented on 3 October 2005 following Dilman's (2000) four-wave procedure. We sent instructions with each questionnaire asking that it be completed by the recipient. A Hunter Task Force approach for setting season dates currently is used in three zones, but not in the Long Island Zone. To ensure respondents shared the same understanding of this approach, we provided the following information in the mail questionnaire:

> **Each year, DEC biologists must determine hunting season dates for both early and late splits in each of 4 waterfowl hunting zones. Since 1997, task forces made up of duck hunter representatives have helped suggest season dates for the Western, Northeastern, and Southeastern Zones. This survey will provide additional information about why duck hunters prefer to have the duck season open at certain times during the fall and winter, and will help those task forces better understand the issues that are most important to hunters when various dates are being considered.**

Because we achieved the desired 400 respondents in the four major management zones (396 for Long Island), and because nonrespondents usually are less interested in the study topic, we did not conduct an assessment of non-response bias. All studies of human behavioral characteristics and attitudes that involve taking samples from a large population have a margin of error associated with them. This margin of error varies according to sample size and the percentage of respondents giving

a particular answer to each question. We selected the sample for this study to obtain precise and reliable information at the level of waterfowl management zone as well as statewide.

The maximum expected margin of error at the 95% confidence level for this study is ±5.0% (Table 1). For example, given a variable for which 70% of the respondents possess a characteristic and 30% do not, with 396 survey returns (i.e., Long Island Zone), and assuming random sampling with no measurement error, one can have 95% confidence that the percent of the sample proportion possessing the characteristic will be between 65.4% and 74.6% (i.e., +/- 4.6%). Thus, the percentage of duck hunters from the Long Island Zone who have the characteristic would fall between 65.4% and 74.6% 95 times out of every 100 that a sample of 900 duck hunters was drawn from the population of duck hunters in that zone and a similar response rate was experienced. Because of higher numbers of respondents in the other zones, the margin or error is smaller for those zones.

Table 1. Maximum margin of error at the 95% confidence level for responses to any zone-specific question in a statewide survey of duck hunters in New York State conducted in 2005.

Response percentage	Margin of error
10% or 90%	± 3.0%
20% or 80%	± 4.0%
30% or 70%	± 4.6%
40% or 60%	± 4.9%
50%	± 5.0%

Measurement of Human Dimensions Concepts in the Mail Questionnaire

Preferences for Season Dates and Opening Day:

We first asked recipients to indicate in which 1 zone out of the 5 in New York State (including the Lake Champlain Zone) season dates were most important to them. Next, we assessed how important it was from "very important" (1) to "not at all important" (4) for them to be able to hunt ducks in this zone during each week from the first week in October through the fourth week in January (plus Thanksgiving and Christmas days). To develop a preference index for each time period, we recoded the responses as follows: very important = 2, moderately important = 1, slightly important = 0, and not at all important = -1, and summed the preference scores within each time period. Then, for each time period, we plotted the summed preference index scores.

Also, to determine whether preferences of hunters who identified very few (i.e., 1-2) time periods for which it was "very important" to have the season open were "diluted" by preferences of hunters who identified many (i.e., 3-18) "very important" time periods, we weighted the 1 or 2 "very important" time periods by 10x (i.e., recoded so 2 = 20) and re-ran the analysis. Then, we compared the plots for the weighted and un-weighted data to decide which plots best reflected input from all hunters regardless of how many time periods they preferred highly.

To determine reasons why hunters preferred to be able to hunt ducks certain weeks but not others, we asked them to indicate the level of importance for 9 possible reasons. These included personal reasons, perceptions of duck abundance or species availability, interactions with other hunters or non-hunters, conflicts with other hunting seasons, and weather conditions.

We also asked recipients to indicate their preference for opening day of the duck season to be a weekday (but not a holiday) or a weekend day. We followed that question by asking recipients to indicate reasons for their preference using the same kind of format for their preferences about season dates. Among the 6 possible reasons we listed were items pertaining to interactions with other hunters and the non-hunting public, personal convenience, and ease of access.

Opinions About Characteristics of Hunter Task Forces:

First, we asked recipients if they had been aware of the use of Task Forces to recommend season dates prior to receiving our survey. If they had been aware of the task forces, we asked them to indicate the number of years they had personally provided input to a task force member from never, 1-3 years, 4-6 years, or 7+ years.

We asked all recipients, not just those who had been aware of the task forces previously, to indicate their preferred mix of 4 types of characteristics for task force members. We assessed each type of characteristic using pairs of descriptive terms labeled A and B (e.g., A = casual duck hunters and B = avid duck hunters), and asked recipients to indicate on a scale from 1 to 5 their preference for that characteristic, where 1 = only A, 3 = equal amounts of A and B, and 5 = only B). The 4 specific pairs of terms we used were: (1) DEC biologists – Hunter representatives, (2) casual duck hunters – avid duck hunters, (3) lots of duck-hunting experience – little duck-hunting experience, and (4) members of waterfowl associations or other organized sportsmen's groups – not members of waterfowl associations or other organized sportsmen's groups.

We asked recipients to indicate their preferences for each of seven possible mechanisms through which task force members might get input from other duck hunters. For each possible mechanism, recipients indicated their preference by choosing a single response from (1) definitely yes, (2) probably yes, (3) maybe yes, (4) maybe no, (5) probably no, or (6) definitely no. The 7 possible mechanisms included not contacting other hunters (i.e., basing recommendations for season dates only on their own experience) to allowing hunters to contact task forces members in a variety of ways including attending task force meetings, to having DEC sponsor a scientific survey of hunters' preferences.

We asked recipients to indicate their preferences for 4 kinds of information Task Force members should consider when recommending season dates. The kinds of information were: (1) when the greatest number of hunters want the season open, (2) when avid/experienced hunters want the season open, (3) when the most youth can probably hunt, and (4) when duck are most abundant. Recipients indicated their preference for each kind of information using a 1-6 scale from "definitely yes" to "definitely no" as described above.

We also asked recipients to indicate the extent to which they supported use of Task Forces to recommend season dates. Response choices were: great extent, moderate extent, slight extent, and not at all.

General Duck Hunting Experiences:

We assessed overall duck-hunting experience and interest using 4 questions. First we asked recipients to indicate the time period in which they started hunting ducks (i.e., before 1970; 1970-79; 1980-88; 1989-96; or 1997-2004). Second, we asked how many of the last 5 years they hunted ducks (from 0 to 5). We asked recipients to indicate how important duck hunting is to them using 4 possible response categories: (1) it is my most important recreational activity, (2) it is one of my most important recreational activities, (3) it is no more important than my other recreational activities, or (4) it is one of my least important recreational activities.

We asked several questions about specific experiences in 2004 (the year prior to the survey) to compare characteristics of respondents in 2005 with respondents from a 1989 statewide duck hunter survey (Enck and Decker 1990). First, we asked how many days they hunted for ducks and how many ducks they harvested in each of the 5 zones in New York (including the Lake Champlain Zone) in 2004. Then we asked whether they intended to hunt ducks in New York in 2005.

As in the earlier study, we developed typologies of duck hunters based on the kinds of waterfowl they hunted in 2004 (TYPEFOWL), kinds of habitats they hunted (TYPEHAB), and type of land they had accessed to hunt (TYPEACC). First, we asked recipients to indicate how many days they hunted during the 2004 season primarily for diving ducks, dabbling ducks, and geese. We summed these days for each respondent, and characterized TYPEFOWL based on the type of waterfowl they had hunted >50% of days: diving duck hunter, dabbling duck hunter, goose hunter, or generalist (if they did not hunt for >50% days primarily for any one type).

Next we asked how many days they had hunted during the 2004 season in shallow water marshes, beaver ponds, or small rivers; how many days in big rivers, big lakes, or ocean; and how many days in agricultural fields. Similar to the approach described above, we summed these days for each respondent, and characterized TYPEHAB based on the type of habitat they had hunted >50% of days: shallow water hunter, deep water hunter, field hunter, or generalist (if they did not hunt for >50% days primarily in any one habitat).

For the third typology, we asked how many days they had hunted on public land, private land for free, and private land for pay, including leased land, shooting preserves, or waterfowl hunting clubs. We summed these days for each respondent, and characterized TYPEACC based on the type of land they had accessed for hunting on >50% of days: public land hunter, private land for free hunter, private land for pay hunter, or generalist (if they did not hunt for >50% days primarily using any one type of access).

To compare characteristics of respondents to this 2005 survey with respondents to a survey of Lake Champlain zone hunters conducted in 2003 (Brown and Enck 2004), we asked whether recipients had participated in a Youth Waterfowl Hunting Weekend in 2004 (i.e., as an adult sponsor, a youth participant, or not at all). We also asked recipients how many days they had hunted with a commercial waterfowl hunting guide in New York during the 2004 season.

Social and Demographic Characteristics:

We asked recipients to indicate the highest level of education they had obtained: (1) primary school, (2) high school diploma or GED, (3) some college, (4) college degree, (5) post graduate degree, or (6) professional degree. We asked them to indicate a category that best described the type

of area where they lived: (1) on a farm, (2) a rural area, but not a farm, (3) village or city with <25,000 people, (4) city with 25,000-49,999 people, or (5) city with ≥50,000 people. Also, we asked recipients to indicate their gender.

General Analysis of Data:

We analyzed all survey data using SPSS-X (Version 14.0), and used $p = 0.05$ as the significance threshold for all analyses. We used ANOVA to compare means among zones, and Chi-square tests to compare categorical data. We reported statewide, aggregated data except variables for which significant differences existed among zones.

RESULTS

Survey Response and Non-response Bias

The initial sample of 3,600 duck hunters resulted in 3,411 deliverable questionnaires and 1,836 useable returns (53.8% response rate). We achieved our desired 400 responses in all zones except Long Island, which fell only four responses short: Long Island = 396 (46.9% of deliverable questionnaires), Northeastern = 405 (50.1%), Southeastern = 546 (57.5%), and Western = 489 (60.5%).

Characteristics of Respondents

New York State duck hunters overwhelmingly are male (98%), fairly well-educated (69% have completed at least some college), and live in non-urban areas (50% live in rural areas and another 29% living in villages or small cities of fewer than 25,000 residents). Duck hunters expressed a range of avidity (i.e., importance) toward duck hunting as a "recreational activity," with respondents from the Long Island Zone indicating that duck hunting as slightly more important to them as compared to respondents from the other zones ($X^2 = 19.313$, df = 9, $p = 0.023$). Specifically, 15% of Long Island respondents said duck hunting was their most important activity (compared to 10-13% for the other zones), and 67% said it was one of their most important (compared to 59-63% for the other zones).

Statewide, those with lower levels of avidity were more likely to express decreasing interest in duck hunting (Table 2). However, overall, slightly fewer than one-half (48%) said their interest in duck hunting had not changed over the previous five years, and about three times as many said their interest had increased as said it had decreased. No differences in these patterns existed among the four zones ($X^2 = 11.412$, df = 6, $p = 0.076$).

About one-half of respondents were either relatively new duck hunters who started duck hunting between 1997 and 2004 (24%), or were veteran hunters who started prior to 1970 (26%). The remainder was relatively evenly split with respect to when they started hunting ducks (Table 3). The vast majority of respondents (72%) were consistent duck hunters who hunted each of the previous 5 years (no differences among zones, $p = 0.326$, grand mean = 4.40 years out of 5). Very few (1%) had apparently dropped-out (i.e., disassociated) from duck hunting, having not hunted ducks during any of the previous 5 years. The other 27% of respondents had hunted ducks sporadically during the previous 5 hunting seasons (Table 4). Overall, 95% of active duck hunters intended to hunt ducks during the up-coming 2005 season, including about one-half (47%) of respondents who had not hunted any year during the past five.

Table 2. Importance of duck hunting as a recreational activity to active duck hunters in New York State compared with change in interest in duck hunting over the last 5 years, based on a mail survey in 2005.

Importance of duck hunting	Change in interest compared to 5 years ago: Less interested n	%	No change in interest n	%	More interested n	%	Importance totals n	%
One of my least important recreational activities	14	6.0	13	1.5	7	1.0	34	1.9
No more important than my other recreational activities	105	44.7	207	23.8	117	16.5	429	23.7
One of my most important recreational activities	110	46.8	541	62.2	479	67.7	1130	62.3
My most important recreational activity	6	2.6	109	12.5	105	14.8	220	12.1
Interest totals	235	13.0	870	48.0	708	39.0	1813	100.0

Table 3. Years during which active duck hunters in New York State started hunting ducks, based on a mail survey conducted in 2005.

Period of years	n	%
Before 1970	485	26.4
1970 – 1979	350	19.1
1980 – 1988	286	15.6
1989 – 1996	268	14.6
1997 – 2004	446	24.3
	1835	100.0

Table 4. Participation categories of active duck hunters in New York State reflecting the number of years they hunted ducks during the previous 5 years, compared with intention to hunt in the up-coming 2005 hunting season, based on a mail survey conducted in 2005.

	Participation categories							
Intention to hunt ducks in 2005?	Probable drop-outs (hunted 0 out of) previous 5 years) n	%	Probable sporadic hunters (hunted 1-4 out of previous 5 years) n	%	Probable consistent hunters (hunted 5 out of previous 5 years) n	%	Intention totals n	%
No	10	53	51	11	25	2	86	5
Yes	9	47	429	89	1279	98	1717	95
	19	100	480	100	1304	100	1803	100

Statewide, a plurality of respondents was characterized as "dabbling duck hunters" (49%) for TYPEFOWL, with another 29% typed as "goose hunters" (Table 5). We found some expected differences among the 4 major zones ($X^2 = 105.354$, df = 9, $p < 0.001$). Hunters from the Long Island were more likely than those from other zones to be "diving duck hunters" or "generalists," and less likely to be "goose hunters." Substantially higher percentages of hunters from the Northeastern and Southeastern zones were "dabbling duck hunters" compared to the other two zones. Western Zone hunters had the highest percentage typed as "goose hunters."

Table 5. Types of waterfowl hunted most often during the 2004 waterfowl season by active duck hunters residing in 4 waterfowl management zones in New York State, based on a mail survey conducted in 2005.

	Waterfowl management zones								TYPEFOWL totals	
Types of waterfowl hunted TYPEFOWL	Long Island n	%	Northeastern n	%	Southeastern n	%	Western n	%	n	%
Diving duck hunters	32	8.1	17	4.2	6	1.1	16	3.3	71	3.9
Dabbling duck hunters	170	42.9	225	55.1	302	55.1	203	41.6	900	48.9
Goose hunters	40	10.1	63	15.4	128	23.4	109	32.1	340	18.5
Generalists	154	38.9	103	25.2	112	20.4	160	32.8	529	28.8
Zone totals	396	100	408	100	548	100	488	100	1840	100

Statewide, a plurality of respondents was characterized as "shallow water hunters" (48%) for TYPEHAB, with an almost even split among the other three types (Table 6). We found differences among the four zones ($X^2 = 53.813$, df = 9, $p < 0.001$). A greater percentage of hunters from the Long Island Zone compared to the other zones were "shallow water hunters," whereas a smaller percentage of hunters from the Western Zone were of this type compared to the other zones. Hunters in the Southeastern and Western zones were about twice as likely as in the other zones to be classified as "field hunters."

Most hunters were characterized either as "private land for free hunters" (45%), or "public land hunters" (40%) on a statewide basis for TYPEACC (Table 7). Again, we found differences among zones ($X^2 = 173.342$, df = 9, $p < 0.001$). Almost twice the percentage of Long Island hunters as other hunters primarily accessed public land for waterfowl hunting. Long Island hunters also were much less likely to access private land for free. Hunters from the Northeastern Zone also exhibited these patterns, but on a much lesser scale than Long Island hunters.

Table 6. Types of habitats hunted most often during the 2004 waterfowl hunting season by active duck hunters residing in 4 waterfowl management zones in New York State, based on a mail survey conducted in 2005.

	Waterfowl management zones								TYPEHAB	
Types of habitats hunted TYPEHAB	Long Island		Northeastern		Southeastern		Western		totals	
	n	%	n	%	n	%	n	%	n	%
Shallow water hunters	233	58.8	212	52.0	257	46.9	190	38.9	892	48.5
Deep water hunters	65	16.4	74	18.1	93	17.0	97	19.9	329	17.9
Field hunters	38	9.6	42	10.3	95	17.3	106	21.7	281	15.3
Generalists	60	15.2	80	19.6	103	18.8	95	19.5	338	18.4
Zone totals	396	100	408	100	548	100	488	100	1840	100

Table 7. Types of properties accessed most often for hunting waterfowl during the 2004 waterfowl hunting season by active duck hunters residing in 4 waterfowl management zones in New York State, based on a mail survey conducted in 2005.

Types of properties hunted TYPEACC	Waterfowl management zones: Long Island n	%	Northeastern n	%	Southeastern n	%	Western n	%	TYPEACC totals n	%
Public land	247	62.4	162	39.7	169	30.8	157	32.2	735	39.9
Private land for free	69	17.4	195	47.8	303	55.3	263	53.9	830	45.1
Private land for pay	24	6.1	14	3.4	12	2.2	13	2.7	63	3.4
Generalists	56	14.1	37	9.1	64	11.7	55	11.3	212	11.5
Zone totals	396	100	408	100	548	100	488	100	1840	100

Duck Hunting Activity in 2004

We found differences between zones for the mean number of days hunted during the 2004 season ($F = 12.145$; $df = 3$; $p < 0.001$), mean number of ducks bagged during the season ($F = 5.229$; $df = 3$; $p = 0.001$), and mean number of ducks bagged per day ($F = 13.420$; $df = 3$; $p < 0.001$). Specifically, waterfowlers who hunted the Long Island Zone (not those who lived there) hunted the most days on average whereas respondents who hunted the Western Zone bagged the most total ducks during the 2004 hunting season, and those who hunted the Northeastern Zone bagged the most per day during the season (Table 8).

Table 8. Mean number of days hunted, mean number of ducks harvested, and mean number of ducks harvested per day by persons hunting in various waterfowl hunting zones in New York during the 2004 waterfowl hunting season, based on a mail survey conducted in 2005.

Zones (n)	Variables: Days hunted mean (SE)	Total ducks bagged mean (SE)	Ducks bagged/day mean (SE)
Long Island (313)	14.0 (0.70)	15.0 (1.20)	1.0 (0.06)
Southeastern (377)	9.6 (0.44)	12.2 (0.80)	1.2 (0.05)
Northeastern (498)	10.5 (0.43)	15.8 (0.95)	1.5 (0.05)
Western (513)	12.1 (0.50)	18.1 (1.22)	1.4 (0.05)
Statewide (1,701)	11.4 (0.26)	15.5 (0.54)	1.3 (0.03)

Very few respondents (n = 77) used a commercial waterfowl hunting guide during 2004. The majority of those who used a guide were from the Long Island Zone. With few exceptions, hunters used a commercial guide for only one or two days (Table 9). Because respondents could hunt in more than one zone, we do not know the zone in which respondents used a guide.

Similarly, participation in the 2004 Youth Waterfowl Hunting Weekend was low (Table 10). Overall, participation ranged from about 6% of respondents from the Long Island Zone to 14% of respondents from the Western Zone (we do not know in which zone people may have participated). The vast majority of participants identified in the survey were adult sponsors0.

Table 9. Mean number of days that waterfowlers from various waterfowl management zones in New York State used a commercial waterfowl hunting guide during the 2004 hunting season, based on a mail survey conducted in 2005.

Waterfowl management zone	Number of hunters using guides (% of all hunters in zone)	Mean number of days that guides were used (SE)	Range of days guides were used (% who used guides for only 1-2 days)
Long Island	47 (12.1%)	2.7 (0.28)	1-8 (60% for only 1-2 days)
Southeastern	12 (2.3%)	6.4 (3.07)	1-30 (67% for only 1-2 days)
Northeastern	2 (0.5%)	21.0 (14.00)	7-35 (0% for only 1-2 days)
Western	16 (3.4%)	1.7 (0.31)	1-6 (94% for only 1-2 days)

Table 10. Numbers of hunters from various waterfowl hunting zones in New York State who participated in a Youth Waterfowl Hunting Weekend during the 2004 hunting season, based on a mail survey conducted in 2005.

	Waterfowl management zones								Type totals	
Types of participants	Long Island n	%	Northeastern n	%	Southeastern n	%	Western n	%	n	%
Not a participant	365	93.6	354	89.8	474	89.3	407	86.2	1600	89.5
Youth participant	6	1.5	3	0.8	6	1.1	9	1.9	24	1.3
Adult sponsor	19	4.9	37	9.4	51	9.6	56	11.9	163	9.1
Zone totals	390	100	394	100	531	100	472	100	1787	100

Preferences For Season Dates

Time Periods During Which Duck Hunters Most Prefer That The Season Is Open:

Long Island Zone. Hunters for whom the Long Island Zone is most important for season dates generally prefer the season to be open from about mid November through the end of January (Figure 8). In general, it is not very important for the season to be open on Thanksgiving or Christmas. Long Island hunters identified from 0-18 time periods for which it was "very important" to have the season open. We found no differences in patterns of preferences for season dates regardless of age/experience of the hunters (i.e., (1) started duck hunting <1970, (2) started duck hunting between 1970 and 1996, and (3) started duck hunting in 1997 or later). Similarly, whether one's interest in duck hunting had decreased, stayed the same, or increased over the previous 5 years had no influence on preferences for seasons dates.

Only 7% (n = 29) Long Island hunters identified that it was "very important" for the season to be open during just a few (i.e., 1-2) time periods. In general, these 29 were less avid and less interested in duck hunting than those who said it was "very important" for 3-18 time periods. When we weighted the preferences of these 29 hunters to examine if their preferences were "diluted" by hunters who expressed that it was "very important" to have the season open for many weeks, the only difference we found was that the index for the 4th week in November (N4) was higher than the index for the 1st week in December. Thus, using un-weighted data, the top eight time periods for which the season should be open were (in descending order of preference): 1st week in January (J1), 4th week in December (D4), 3rd week in December (D3), 2nd week in January (J2), 3rd week in January (J3), 3rd week in December (D3), 2nd week in December (D2), and 4th week in January (J4).

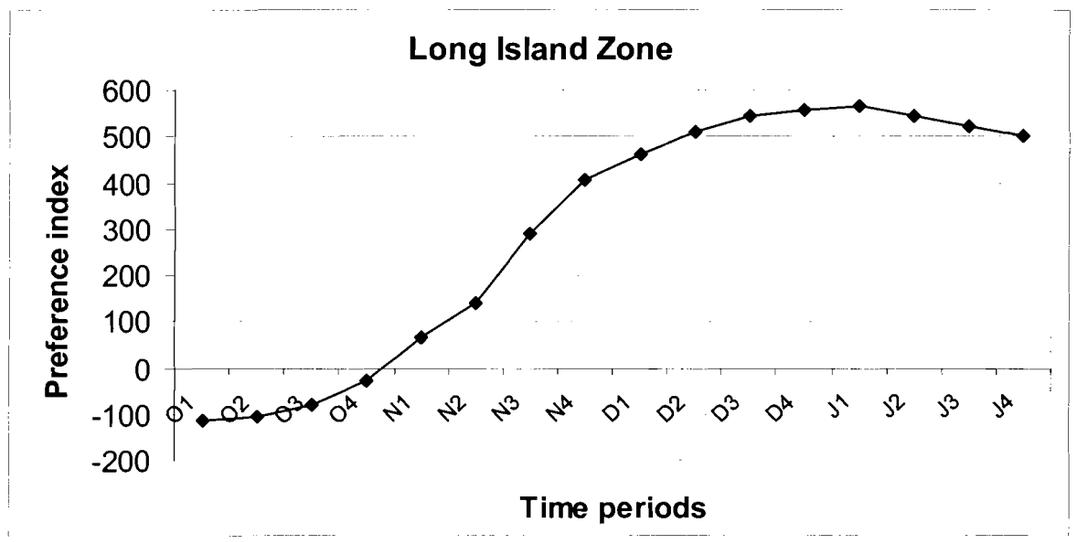


Figure 5. Week-by-week preference indices for when duck hunters from the Long Island Waterfowl Management Zone in New York State want to be able to hunt ducks, based on a mail survey conducted in 2005.

Northeastern Zone. Hunters for whom the Northeastern Zone is most important for season dates generally prefer the season to be open as early as possible, with it closed by mid December at the latest (Figure 9). It is not very important to these hunters for the season to be open on Thanksgiving or Christmas. Northeastern Zone hunters identified from 0-18 time periods for which it was "very important" to have the season open. We found no differences in patterns of preferences for season dates regardless of age/experience of the hunters (i.e., (1) started duck hunting <1970, (2) started duck hunting between 1970 and 1996, and (3) started duck hunting in 1997 or later). Similarly, whether one's interest in duck hunting had decreased, stayed the same, or increased over the previous 5 years had no influence on preferences for seasons dates.

In this zone, 23% (n = 93) hunters identified that it was "very important" for the season to be open during just a few (i.e., 1-2) time periods. These respondents were less avid and less interested in duck hunting than those who said it was "very important" for 3-18 time periods. When we weighted the preferences of these 93 hunters to determine if their preferences were "diluted" by hunters who expressed that it was "very important" to have the season open for many weeks, the pattern in Figure 9 did not change. Thus, using un-weighted data, the top eight time periods for which the season should be open were (in descending order of preference): O2, O3, O1, O4, N1, N2, N3, and N4.

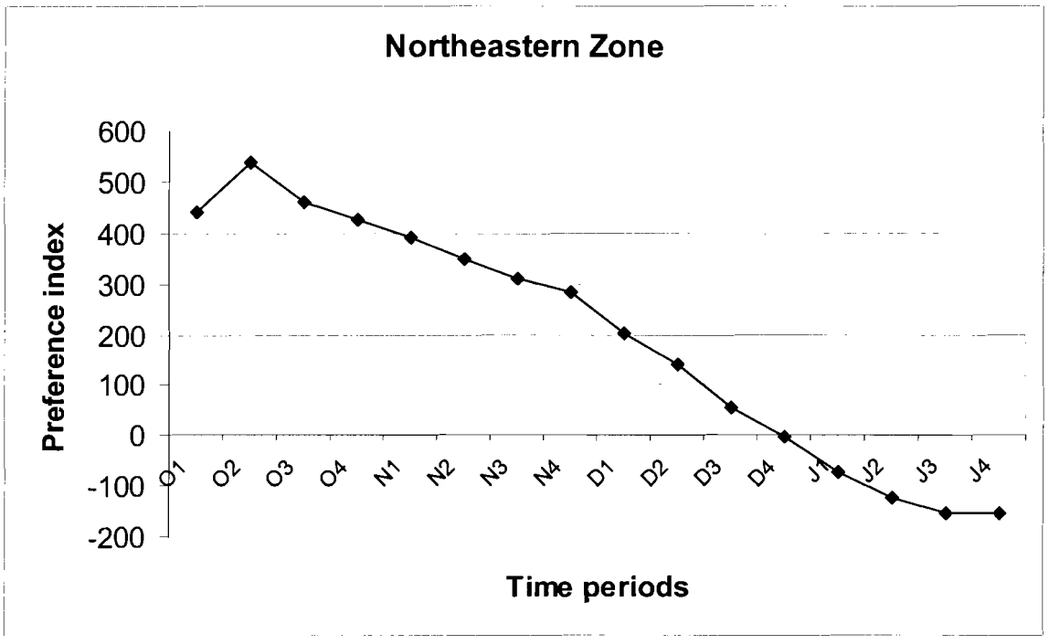


Figure 6. Week-by-week preference indices for when duck hunters from the Northeastern Waterfowl Management Zone in New York State want to be able to hunt ducks, based on a mail survey conducted in 2005.

Southeastern Zone. Hunters for whom the Southeastern Zone is most important for season dates generally prefer the season to be open from early to mid October, and extending into December (Figure 10). It is not important to these hunters for the season to be open on Thanksgiving or Christmas. Southeastern Zone hunters identified from 0-18 time periods for which it was "very important" to have the season open. We found no differences in patterns of preferences for season dates regardless of age/experience of the hunters (i.e., (1) started duck hunting <1970, (2) started duck hunting between 1970 and 1996, and (3) started duck hunting in 1997 or later). Similarly, whether one's interest in duck hunting had decreased, stayed the same, or increased over the previous 5 years had no influence on preferences for seasons dates.

About 15% (n = 82) of these hunters in this zone identified that it was "very important" for the season to be open during just a few (i.e., 1-2) time periods. Even more than in the other zones, these respondents were less avid and less interested in duck hunting than those who said it was "very important" for 3-18 time periods. We found a higher preference index for O1 when we weighted preferences of these 82 hunters to determine if their preferences were "diluted" by hunters who preferred to have the season open for many weeks. There were no other differences in the pattern between weighted and un-weighted data. Using un-weighted data, the top eight time periods for which the season should be open were (in descending order of preference): O2, O3, N2, N1, O4, O1, and then D3, and D2.

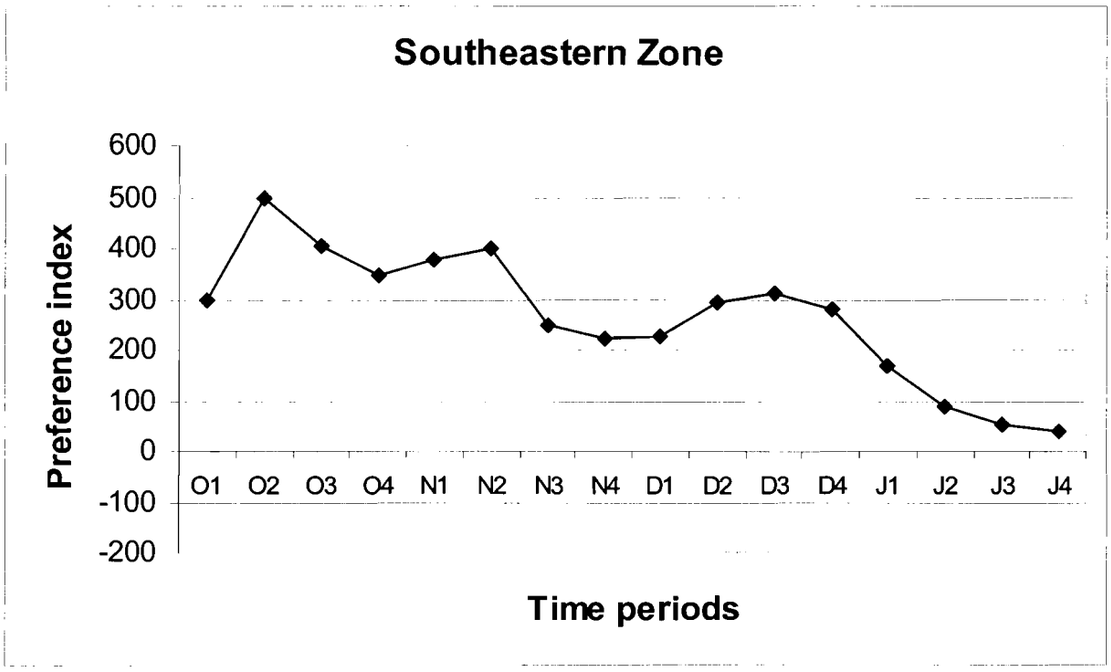


Figure 7. Week-by-week preference indices for when duck hunters from the Southeastern Waterfowl Management Zone in New York State want to be able to hunt ducks, based on a mail survey conducted in 2005.

Western Zone. Hunters for whom the Western Zone is most important for season dates generally prefer the season to be open from about mid October to mid November, and then again from late December through mid January (Figure 11). It is not important to these hunters for the season to be open on Thanksgiving or Christmas. Like hunters in each of the other zones, those from the Western Zone identified from 0-18 time periods for which it was "very important" to have the season open. We found no differences in patterns of preferences for season dates regardless of age/experience of the hunters (i.e., (1) started duck hunting <1970, (2) started duck hunting between 1970 and 1996, and (3) started duck hunting in 1997 or later). Similarly, whether one's interest in duck hunting had decreased, stayed the same, or increased over the previous 5 years had no influence on preferences for seasons dates. However, the 2 peaks in preferences shown below (the first occurring around O2 and O3, and the second occurring around D4 and J1) mostly reflect different hunters; we only found about 30-35% of overlap between the respondents who indicated that O2 or O3 were very important compared to D4 or J1.

About 13% (n = 65) of all hunters in this zone identified that it was "very important" for the season to be open during just a few (i.e., 1-2) time periods. Like the other zones, these respondents generally were less avid and less interested in duck hunting than those who said it was "very important" for 3-18 time periods. The pattern in Figure 11 shifted slightly earlier, when we weighted the preferences of the 65 hunters to determine if their preferences were "diluted" by hunters who expressed that it was "very important" to have the season open for many weeks. However, preference indices still peaked early in the second half of October and early November, and again in lat December and early January. Using the un-weighted data, the top eight time periods for which the season should be open were (in descending order of preference): O3, O4, N1, J1, N2, D4, J2, and O2.

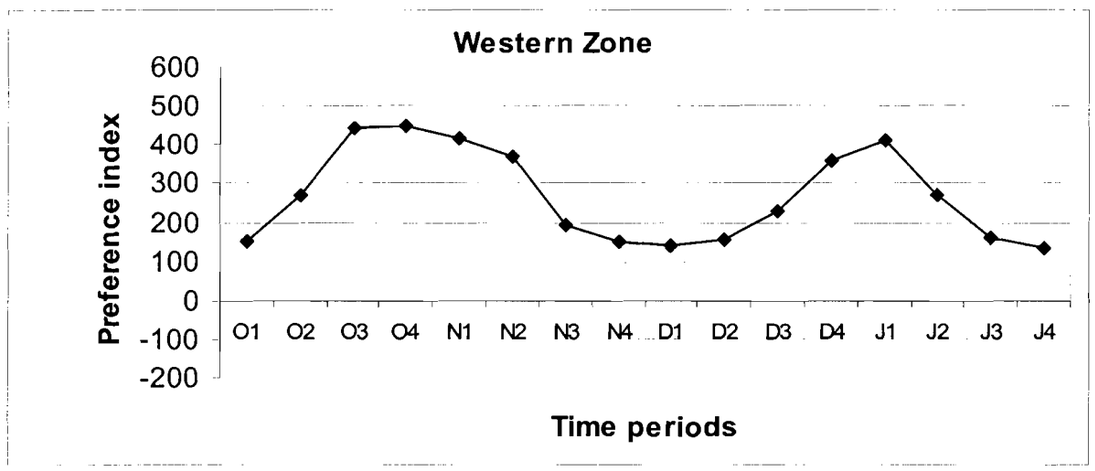


Figure 8. Week-by-week preference indices for when duck hunters from the Western Waterfowl Management Zone in New York State want to be able to hunt ducks, based on a mail survey conducted in 2005.

Lake Champlain Zone. As noted earlier in this report, a fifth waterfowl management zone in New York includes a narrow strip of New York State along the western side of Lake Champlain. Hunting regulations for this zone are decided in conjunction with biologists from the Vermont Department of Fish and Wildlife. Although the number of respondents to our study for whom season dates are most important is low (n = 38 to 40 depending on the question), we present results here for completeness.

Hunters for whom the Lake Champlain Zone is most important for season dates generally preferred the season to be open as early as possible, with lower but consistent preference indices for the period from mid-October to early December (Figure 12). It is not important to these hunters for the season to be open on Thanksgiving or Christmas. Hunters for whom this zone is most important identified from 0-12 time periods for which it was "very important" to have the season open. Five hunters identified that it was "very important" for the season to be open during just a few (i.e., 1-2) time periods. The pattern in Figure 12 did not change when we weighted the preferences of these five hunters to determine if their preferences were "dilute" by hunters who expressed that it was "very important" to have the season open for many weeks.

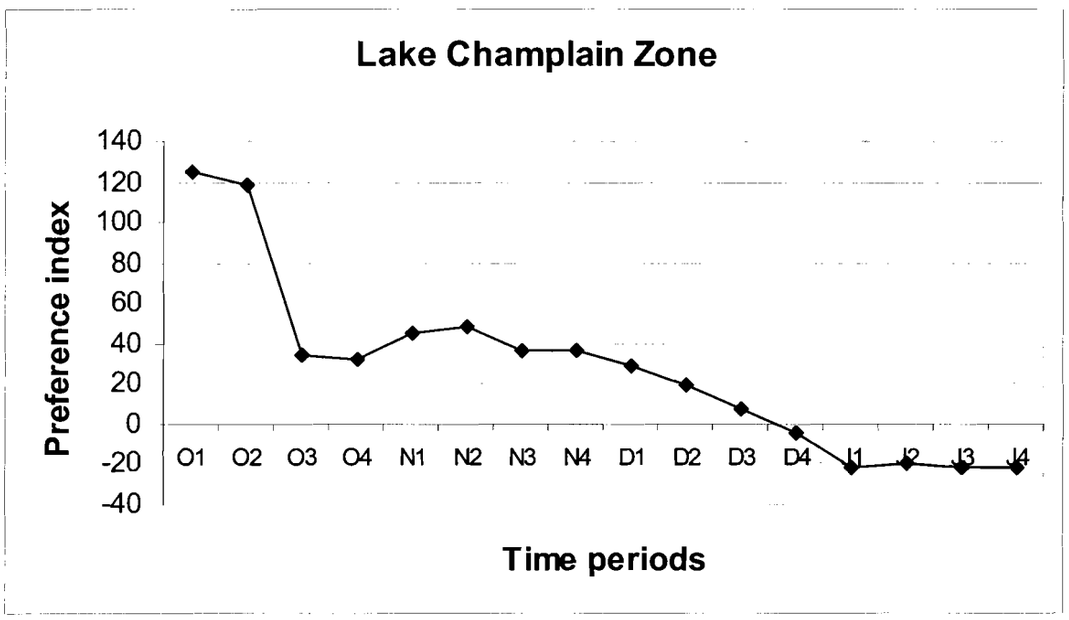


Figure 9. Week-by-week preference indices for when duck hunters from the Lake Champlain waterfowl management zone in New York State want to be able to hunt ducks, based on a mail survey conducted in 2005.

Reasons Why Duck Hunters Prefer Particular Season Dates:

Overall, reasons pertaining to duck abundance (when the most ducks will be around), duck diversity (having best chance to take favorite kinds of ducks), when the weather is best for duck hunting, and having time to hunt were the most important reasons given by hunters in all waterfowl management zones (Table 11). When the goose season is open and potential conflicts with other hunting seasons were second-tier reasons. Third-tier reasons included interference from hunters or from the non-hunting public, and having enough hunters to keep ducks moving around.

Reasons for preferences of Long Island hunters differed from this general pattern. In that zone, having weather that is best for duck hunting was the most important reason. Second tier reasons included duck abundance and diversity. Third tier reasons were having time to hunt, when the goose season is open, and possible conflicts with other hunting seasons. The other possibilities were of lesser importance to Long Island hunters.

We also identified some differences among respondents from the various zones when we examined each possible reason. For example, although duck abundance generally was an important reason underlying the preferences of hunters in all zones, it was especially important in the Western and Northeastern Zones. As noted above, the weather was most important for hunters in the Long Island Zone – as was having time to hunt, and lessening interference from the non-hunting public. The possibility of conflicts with other hunting seasons was more important to hunters from the Western and Southeastern Zones than the other zones.

Finally, within each zone, we found some differences among reasons depending on the time period when respondents started duck hunting — i.e., before 1970, 1970-1996, and in 1997 or later. In 3 zones (Long Island, Northeaster, and Southeastern), "when the weather is best for duck hunting" was very important for majorities of hunters regardless of when they started duck hunting. However, the more recently they started, the more important was "when I have time to hunt." Conversely, the earlier they started, the more important was "when the most ducks are around" and "when I have the best chance to take my favorite kind of ducks."

Reasons underlying preferences for season dates were more complicated in the Western Zone because different groups of hunters preferred to have the duck season open around the middle of October (O2 and or O3) compared to early winter (D4 and or J1). Overall, some reasons were similar for hunters preferring the 2 different times. "When I have time to hunt" was very important to majorities of hunters who started duck hunting fairly recently (since 1997), regardless of whether they preferred the earlier or the later season opportunity. "When the most ducks are around" was very important to majorities in all 3 groups for both preferred periods. "When I have the best chance to take my favorite ducks" was indicated by strong majorities of "older" hunters preferring both the earlier and later periods, and by about one-half of other groups preferring either earlier or later opportunities. "When the weather is best for duck hunting" was indicated by majorities in all 3 groups, but the percent for whom this is important is especially consistent for hunters who started duck hunting since 1997.

Table 11. Mean levels of importance expressed by duck hunters from different waterfowl management zones in New York State for several possible reasons why they prefer particular season dates, based on a mail survey conducted in 2005.

Reasons underlying preferences for season dates	Waterfowl management zones										ANOVA statistics between zones	
	Long Island		Northeastern		Southeastern		Western		Lake Champlain			
	mean	SE	mean	SE	mean	SE	mean	SE	mean	SE	F	p
When the most ducks will be around	1.7[a]	0.05	1.6[b,c]	0.04	1.6[b]	0.04	1.5[c]	0.04	1.6[a,b,c]	0.14	3.62	0.006
When the weather will be best for duck hunting	1.4[a]	0.04	1.8[b]	0.05	1.8[b]	0.05	1.7[c]	0.04	1.6[a,b,c]	0.14	12.75	<0.001
When I will have the best chance to take my favorite kinds of ducks	1.7[a]	0.05	1.8[b]	0.05	1.9[b,c]	0.05	1.8[a,b]	0.05	2.0[a,b,c]	0.16	2.43	0.046
When I have time to hunt	2.0	0.06	1.9	0.05	1.9	0.05	1.9	0.05	2.0	0.18	0.29	0.883
When goose season is open	2.1	0.06	2.2	0.05	2.0	0.05	2.0	0.05	2.2	0.19	1.61	0.168
When there will be the least conflict with other hunting seasons	2.7[a]	0.06	2.4[b]	0.06	2.1[c]	0.05	2.2[c]	0.06	2.8[a,b]	0.20	12.82	<0.001

Table 11. Continued.

Reasons underlying preferences for season dates	Waterfowl management zones: Long Island mean	SE	Northeastern mean	SE	Southeastern mean	SE	Western mean	SE	Lake Champlain mean	SE	ANOVA statistics between zones F	p
When there will be the least interference from other hunters	2.4	0.06	2.5	0.05	2.5	0.05	2.6	0.05	2.5	0.19	1.38	0.239
When enough other hunters will keep the ducks moving around	2.6	0.06	2.6	0.05	2.5	0.05	2.7	0.05	2.6	0.17	1.51	0.196
When there will be the least interference from non-hunters	2.2[a]	0.06	2.8[b,c]	0.05	2.8[c]	0.05	2.9[c]	0.06	2.7[b]	0.20	19.91	<0.001

Lower means reflect higher importance, based on a scale where 1 = very important, 2 = moderately important, 3 = slightly important, and 4 = not at all important. Means followed by the same letters (reading across management zones) are not statistically different.

In the Western Zone, we also found differences in reasons for an earlier vs. later season based on the time periods when hunters first started duck hunting. For those who started before 1970, "best weather" is important to a majority preferring either earlier or later opportunities, but was indicated as very important by an even greater majority of those who prefer to hunt later in season. Among hunters who started in 1970-1996, "when I have time to hunt" is very important to more of the hunters who prefer to hunt earlier. Finally, for those who started since 1997, "when the goose is open" is important to more of those who prefer to hunt earlier.

Preferences For Opening Day On A Weekday vs. A Weekend:

Hunters' preferences for whether the duck season opens on a non-holiday weekday or on a weekend day differed among zones ($X^2 = 78.825$, df= 3, $p < 0.001$, we excluded from this Chi-square analysis the Lake Champlain Zone because of small sample size). Majorities of hunters for whom the Long Island and Lake Champlain zones were most important preferred non-holiday week days (Table 12). Majorities of hunters for whom the other zones were most important preferred weekend days.

Table 12. Percentages of duck hunters from various waterfowl management zones in New York State preferring opening day of duck season to be a non-holiday weekday or a weekend day, based on a mail survey conducted in 2005.

	Waterfowl management zones									
Prefer opening day to be on a...	Long Island		Northeastern		Southeastern		Western		Lake Champlain	
	n	%	n	%	n	%	n	%	n	%
Non-holiday weekday	221	62.4	141	31.3	192	42.6	196	45.0	28	66.7
Weekend day	131	37.6	310	68.7	259	57.4	240	55.0	14	33.3
Zone totals	354	100	451	100	451	100	436	100	42	100

Whether one's interest in duck hunting had decreased, stayed the same, or increased over the previous 5 years influenced preferences for season dates in the Southeastern and Western zones. In the Southeastern Zone, 54% of hunters whose interest had decreased preferred the season to open on a weekday whereas 59% of those whose interest had not changed and 59% of those whose interest had increased preferred a weekend opener. Similarly, in the Western Zone, 53% of hunters whose interest had decreased preferred the season to open on a weekday whereas 53% of those whose interest had not changed and 61% of those whose interest had increased preferred a weekend opener. Strong majorities of hunters, regardless of changes in their duck-hunting interest preferred a weekday opener for the Long Island Zone, and similarly strong majorities preferred a weekend opener in the Northeastern Zone.

Reasons Why Duck Hunters Prefer Opening Day Be On A Weekday Or Weekend:

Reasons for preferring a weekday. The most important reason for preferring a weekday opener in all zones was "least chance of interference from other hunters" (Table 13). "Easier to get access to my favorite spots" was a second-tier reason. The other reasons we examined generally were of lesser importance. The only exception to this overall pattern among zones was among hunters for whom the Long Island Zone was most important. In that zone, "least chance of interference from the non-hunting public" was the second most important reason. This reason was more important in the Long Island Zone than in any other zone ($F = 8.511$, $p < 0.001$). We found no other differences among zones when we compared mean levels of importance hunters indicated for each of the other five possible reasons.

Reasons for preferring a weekend. The most important reason for preferring a weekend opener in all zones was "more convenient due to my work schedule" (see Table 13). "Enough other hunters will keep ducks moving around" was a second tier reason in all zones. Also, "more convenient due to family obligations" was a second-tier reason except the Lake Champlain Zone. The other reasons we examined generally were of lesser importance.

We found differences among zones for three reasons when we compared mean levels of importance indicated by hunters. First, although "enough other hunters will keep ducks moving around" generally was the second most important reason in all zones, it was even more important in the Southeastern Zone than in the other zones ($F = 3.05$, $p = 0.016$). Similarly, "most convenient due to family obligations" was relatively important in all zones, but even more important in the Southeastern and Long Island zones compared to the other zones ($F = 2.53$, $p = 0.039$). Finally, as mentioned above, "least chance of interference from the non-hunting public" was more important in the Long Island Zone than elsewhere ($F = 5.28$, $p < 0.001$).

Comparing reasons for preferring weekday vs. weekend opening days by age of hunters. We discovered some different reasons underlying opening day preferences based on the time periods in which respondents started duck hunting (i.e., <1970, 1970-1996, and >1996). Because these time periods are an index to the age of hunters, we refer to the groups as "older hunters," "mid-aged hunters," and "younger hunters" (Figure 14). Below we describe some of these age-related differences for particular reasons within each zone. Then we describe different age-related differences across zones.

In general, younger hunters reported more "very important" reasons for preferring a weekday opener than older or mid-aged hunters. For example, >30% of younger hunters in the Long Island Zone identified 5 of the 6 reasons we examined as being very important reasons (Figure 14-A). Similarly, in the Northeastern Zone, >30% of younger hunters identified 4 of 6 reasons as very important (Figure 14-C). However, in each zone, some reasons were very important to a higher percentage of older hunters whereas other reasons were important to younger hunters. The older the hunter in the Long Island Zone, the more likely it is that less interference from the public is a reason for preferring a weekday opener. Conversely, the younger the hunter, the more likely it is that easier access and convenience for family are reasons.

Table 13. Mean levels of importance expressed by duck hunters from various waterfowl management zones in New York State for several possible reasons why they prefer to have duck season open on a non-holiday weekday or on a weekend day, based on a mail survey conducted in 2005.

Reasons underlying preferences for opening day	Hunters for whom the Long Island Zone is most important: Prefer week day mean	SE	Prefer weekend mean	SE	t-test t	p	Hunters for whom the Northeastern Zone is most important: Prefer week day mean	SE	Prefer weekend mean	SE	t-test t	p
Least chance of interference from other hunters	1.8	0.06	2.9	0.09	-9.86	<0.001	1.8	0.08	3.1	0.05	-13.07	<0.001
Easier to get access to hunt favorite spots	2.3	0.08	2.7	0.10	-3.21	0.001	2.4	0.10	2.8	0.07	-3.83	<0.001
Least chance of interference from non-hunting public	2.0	0.08	2.7	0.10	-5.20	<0.001	2.4	0.11	3.2	0.06	-6.53	<0.001
Most convenient for work schedule	2.7	0.08	1.6	0.09	8.73	<0.001	2.7	0.11	1.8	0.06	7.65	<0.001
Most convenient for family obligations	2.8	0.08	2.1	0.10	5.23	<0.001	2.9	0.10	2.4	0.07	3.95	<0.001
Other hunters will keep ducks moving	2.8	0.06	2.5	0.10	2.06	0.040	2.9	0.08	2.4	0.06	4.99	<0.001

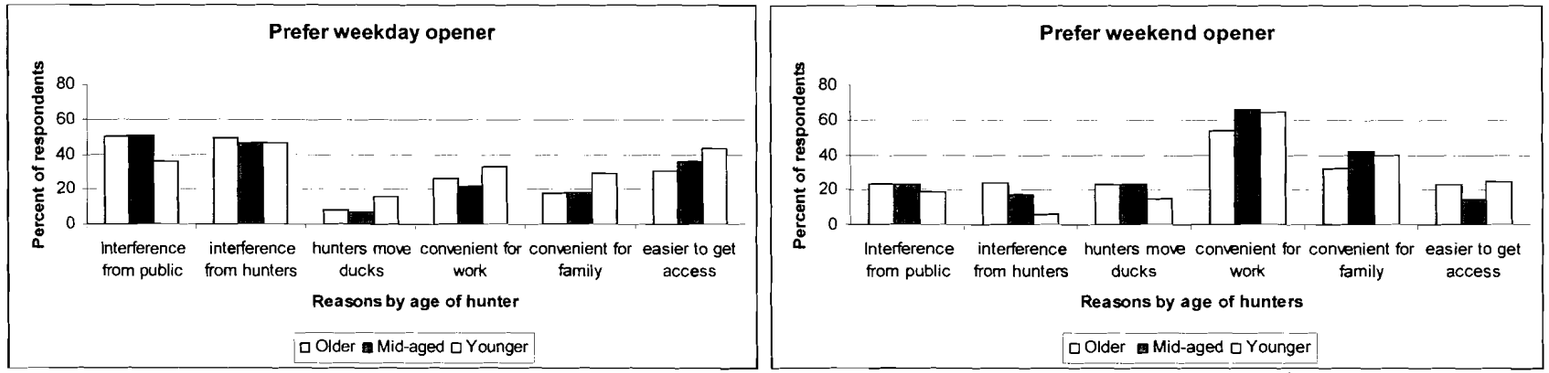
Table 13. Continued.

Reasons underlying preferences for opening day	Hunters for whom the Southeastern Zone is most important: Prefer week day mean	SE	Prefer weekend mean	SE	t-test t	p	Hunters for whom the Western Zone is most important: Prefer week day mean	SE	Prefer weekend mean	SE	t-test t	p
Least chance of interference from other hunters	1.8	0.07	3.1	0.06	-13.13	<0.001	1.8	0.08	3.1	0.06	-12.51	<0.001
Easier to get access to hunt favorite spots	2.4	0.09	2.8	0.07	-3.94	<0.001	2.3	0.09	2.8	0.07	-4.15	<0.001
Least chance of interference from non-hunting public	2.5	0.09	3.0	0.07	-4.99	<0.001	2.6	0.09	3.1	0.07	-4.39	<0.001
Most convenient for work schedule	2.8	0.09	1.7	0.07	9.23	<0.001	2.9	0.09	1.7	0.07	10.86	<0.001
Most convenient for family obligations	2.7	0.08	2.3	0.10	4.15	<0.001	2.8	0.08	2.3	0.08	4.30	<0.001
Other hunters will keep ducks moving	2.7	0.07	2.2	0.07	5.90	<0.001	2.9	0.07	2.4	0.07	5.26	<0.001

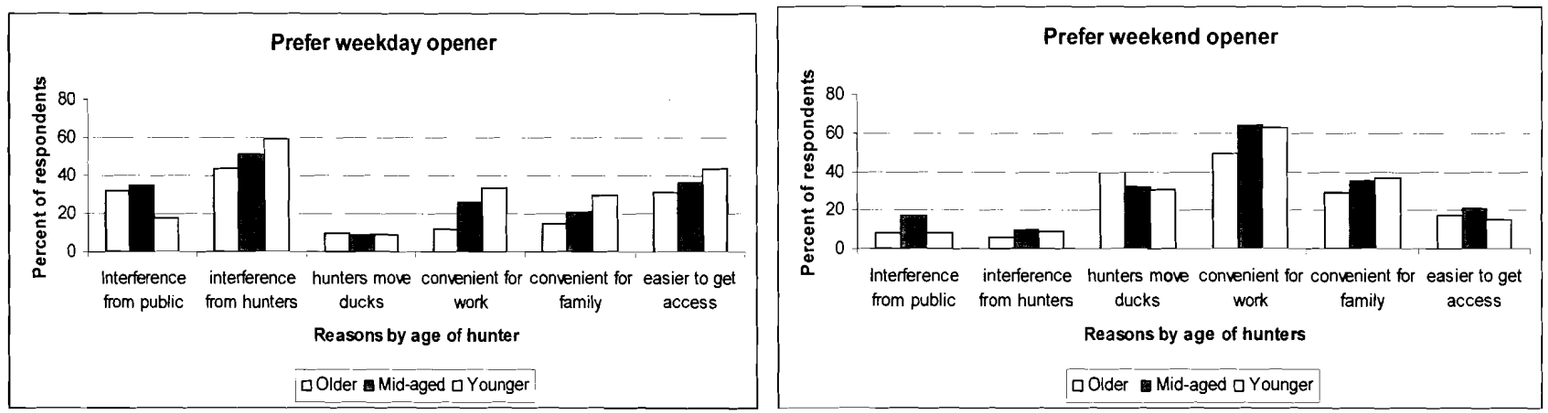
Table 13. Continued.

Reasons underlying preferences for opening day	Hunters for whom the Lake Champlain Zone is most important: Prefer week day mean	SE	Prefer weekend mean	SE	t-test t	p
Least chance of interference from other hunters	2.2	0.23	3.6	0.20	-4.42	<0.001
Easier to get access to hunt favorite spots	2.5	0.27	3.1	0.25	-1.66	0.105
Least chance of interference from non-hunting public	3.0	0.24	2.9	0.33	0.25	0.801
Most convenient for work schedule	2.9	0.26	1.4	0.29	3.56	0.001
Most convenient for family obligations	3.1	0.23	2.8	0.35	0.73	0.471
Other hunters will keep ducks moving	2.8	0.19	2.4	0.31	1.21	0.232

Lower means reflect higher importance, based on a scale where 1 = very important, 2 = moderately important, 3 = slightly important, and 4 = not at all important.

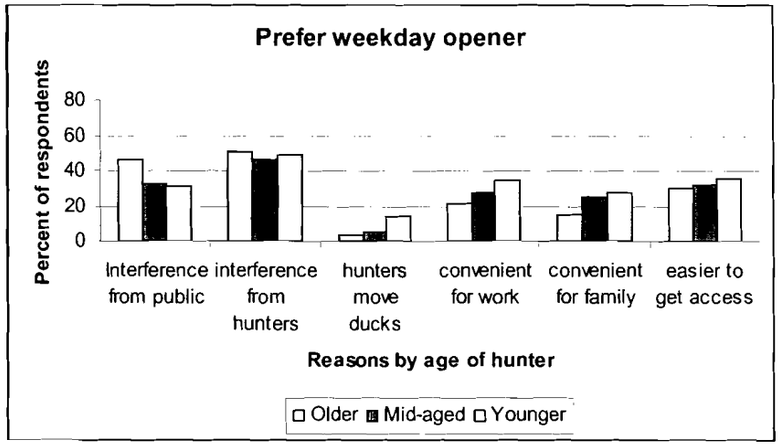


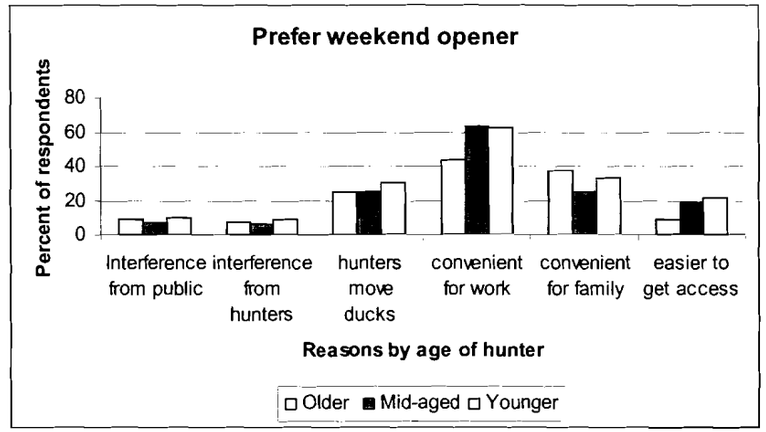
A. Long Island Zone.



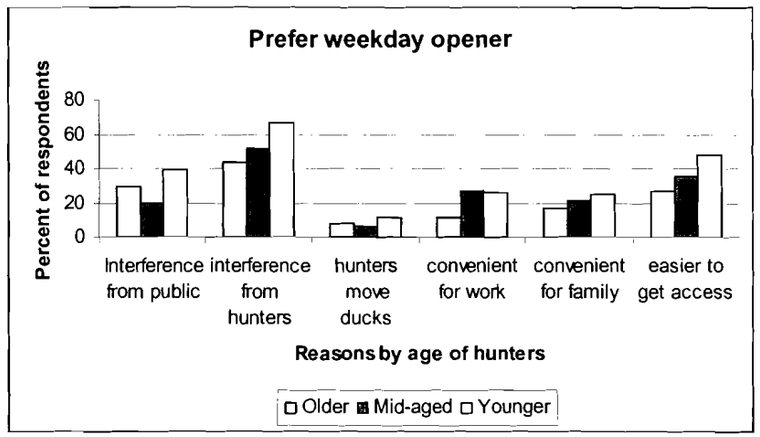
B. Southeastern Zone.

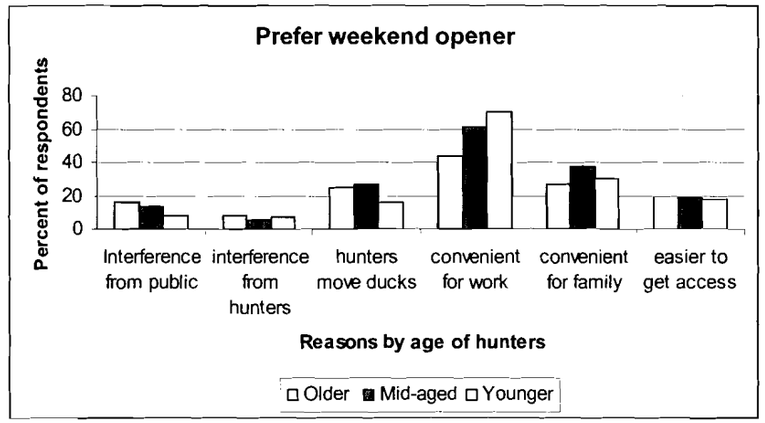
Figure 10. Percentages of older, mid-aged, and younger duck hunters from 4 management zones in New York who indicated various reasons were "very important" to them for opening day of the season to be a non-holiday weekday or a weekend, based on a mail survey conducted in 2005.





C. Northeastern Zone.





D. Western Zone.

Figure 10. Continued.

In the Southeastern Zone (Figure 14-B), the younger the hunter, the more likely it is that less interference from other hunters, ease of access, convenience for work schedule, and for family obligations are very important reasons. On the other hand, less interference from the public is more likely to be a reason for mid-aged and older hunters. In the Northeastern Zone, less interference from the public is more likely to be a reason for older hunters than for mid-aged or younger hunters (Figure 14-C). However, the younger the hunter, the more likely are convenience for work schedule and convenience for family obligations as reasons. Among Western Zone hunters (Figure 14-D), we found a fairly consistent pattern in that the younger the hunter, the more likely it is that any reason is very important.

We found similar kinds of age-related differences within zones with respect to the reasons why respondents preferred a weekend opening day. In the Long Island Zone, younger hunters are more likely to identify convenience due to work or family as reasons whereas older hunters are more likely to identify interference from other hunters. Convenience issues also are more likely to be reasons for younger hunters in the Southeastern Zone whereas hunters moving ducks around is more likely to be a reason for older hunters. In the Northeastern Zone, the younger the hunter, the more likely it is that convenience for work is a reason. However, convenience for family obligations is more likely to be a reason for older hunters. Finally, in the Western Zone, hunters moving ducks around is more likely to be a reason for older and mid-aged hunters whereas convenience for work is more likely to be a reason for younger hunters.

Additionally, we found some differences between zones when we compared each reason. For example, less interference from the public is more likely to be a reason underlying preference for a weekday opener for older and mid-age hunters in the Long Island, Southeastern, and Northeastern zones, but is more likely to be a reason for younger hunters in the Western Zone. Interference from other hunters is more likely to be a reason for younger hunters in the Southeastern and Western zones, but is equally likely to be important for all ages of hunters in the other 2 zones. Among respondents preferring a weekend opener, convenience for work schedule is more likely to be a reason for mid-aged and younger hunters in all zones. On the other hand, having enough hunters to move ducks around is more likely to be a reason for younger hunters in the Northeastern Zone, but more likely to be a reason for mid-aged and older hunters in the other 3 zones.

Opinions About A Task Force Approach To Recommend Season Dates

Statewide, only a minority of hunters (35%) were aware that DEC has used task forces to recommend season dates in some waterfowl management zones. Awareness of the use of task forces was lowest among hunters for whom the Long Island (25%) and Southeastern (29%) zones were most important. Awareness was greatest among hunters for whom the Western Zone was most important, where 44% of respondents were aware of the use of task forces. Awareness by hunters for whom the Lake Champlain and Northeastern zones were most important was 38% and 39%, respectively.

Among all respondents statewide who were aware of the use of task forces to recommend season dates, 66% had never personally provided input to a task force. About one-quarter (23%) of those who were aware of the process had provided information one to three years, 7% had provided input four to six years, and 4% had provided input all years the task forces has been used. The only exception to this general patter was that more aware hunters for whom the Western Zone was most important had never provided input (73%).

In the 3 zones where Task Forces have been used, we found some slight differences in the relationship between respondents' changing interest in duck hunting and whether they had ever provided input to a Task Force member. In the Northeastern Zone, 80% of hunters with declining interest had never provided input, but neither had 62% of those whose interest had not changed, nor 63% of those whose interest had increased. In the Southeastern Zone, those with declining interest were more likely to have provided input (50% had) compared to stable (66% had not) or increasing (62% had not) interest. In the Western Zone, 66% of those with declining interest and 66% of those with stable interest had not provided input, whereas 85% of those with increasing interest had not.

In all zones, hunters who were aware of task forces were more avid than those who were unaware. That is, substantially more of those who were aware of task forces said duck hunting was their most important recreational activity, than those who were unaware. Also, substantially more of those who were unaware indicated that duck hunting was no more important than other recreational activities, compared to those who were aware. In the three zones where task forces have been used (i.e., Southeastern, Northeastern, and Western), substantially more of the aware hunters indicated an increasing interest in waterfowl hunting over the previous five years, compared to unaware hunters.

Overall, support for the use of task forces was fairly high in all zones, regardless of whether respondents were aware that they had been used in some of the zones. About one-half of both aware respondents (52-57% depending on the zone) and unaware respondents (50-56%) indicated they supported the use of task forces "to a moderate extent." Many of the remainder indicated they supported the concept "to a great extent" (32-43% for aware respondents, 33-35% for unaware respondents). In each of the zones, $\leq$2% of aware or unaware respondents expressed no support at all for the concept.

Preferences Related To Characteristics Of Task Forces To Recommend Season Dates

In this section, we present results for hunters for whom the Long Island, Northeastern, Southeastern, or Western zones are most important. We do not present results for the Lake Champlain Zone because few hunters identified it as being most important to them.

Preferred Task Force Membership:

DEC biologists and hunter representatives. Very avid hunters (i.e., duck hunting is their most important recreational activity) and less avid hunters showed similar patterns in their preferences for whether task force membership should be only DEC biologists, only hunter representatives, or a mix (Table 14). One-half to two-thirds of hunters in all zones, regardless of avidity, said membership should be an equal mix of DEC biologists and hunter representatives. Relatively few respondents indicated membership should be only one or the other. A greater percentage of avid hunters for whom the Northeastern Zone was most important, compared to avid hunters from the other zones, preferred mostly hunter representative with some DEC representation. Conversely, a greater percentage of avid hunters from the Southeastern Zone, compared to avid hunters from the other zones, preferred only or mostly DEC representatives.

Avidity of hunter representatives. Very avid and less avid hunters differed in their preferences for whether hunter representatives should be only casual hunters, only avid hunters, or some mix (Table 15). Majorities of very avid hunters in three zones preferred hunter representatives to be only avid hunters, with many additional respondents indicating a preference for mostly avid hunters with some casual hunters. In the Western Zone, preferences were split between (1) only avid hunters, and (2) mostly avid with some casual hunters. Preferences of less avid hunters in all four zones were relatively split between (1) equal representation of casual and avid hunters, (2) mostly avid with some casual hunters, and (3) only avid hunters.

Amount of duck-hunting experience. Preferences related to how much duck-hunting experience task force members should have were nearly identical to preferences for duck-hunting avidity of representatives (Table 16). Majorities of avid hunters from three of the four zones (hunters from the Western Zone showed the same pattern as described above) preferred only representatives with "lots of experience," and many others preferred mostly experienced hunters with some less-experienced representatives. Preferences of less avid hunters in all zones were relatively split between (1) equal representation of experienced and inexperienced hunters, (2) mostly experienced with some inexperienced hunters, and (3) only experienced hunters.

Membership in hunting organizations. Preferences about whether representatives should be only members of organized groups, only hunters who are not members of such groups, or a mix differed among zones (Table 17). Pluralities of very avid hunters for whom the Long Island or Southeastern zones were most important preferred task force representatives to be only members of hunting organizations. In the Northeastern and Western zones, pluralities of very avid hunters preferred an equal mix of members and non-members of hunting organizations. Less avid hunters in all zones preferred a mix of members and non-members. Relatively few very avid or less avid hunters in any zone (i.e., <13%) preferred task force representatives to be mostly non-members or only members of hunting organizations.

Table 14. Percentages of duck hunters from various waterfowl management zones in New York State, by level of duck-hunting avidity, indicating whether they preferred representatives of season-setting task forces to be only state waterfowl biologists, only hunter representatives, or some combination, based on a mail survey conducted in 2005.

Preferred membership of task force	Long Island Zone		Northeastern Zone		Southeastern Zone		Western Zone	
	Most avid (n = 48)	Less avid (n = 289)	Most avid (n = 63)	Less avid (n = 375)	Most avid (n = 39)	Less avid (n = 407)	Most avid (n = 36)	Less avid (n = 381)
Only DEC biologists	8.3	6.6	9.5	4.8	15.4	7.1	8.7	6.8
Mostly biologists some hunters	12.5	14.9	11.1	13.9	17.9	14.0	4.3	17.8
Equal biologists and hunters	58.3	62.6	52.4	61.3	48.7	64.1	69.6	59.8
Mostly hunters some biologists	14.6	11.1	20.6	14.4	10.3	9.3	13.0	9.7
Only hunter representatives	6.3	4.8	6.3	5.6	7.7	5.4	4.3	5.8

Table 15. Percentages of duck hunters from various waterfowl management zones in New York State, by level of duck-hunting avidity, indicating whether they preferred representatives of season-setting task forces to be only casual duck hunters, only avid duck hunters, or some combination, based on a mail survey conducted in 2005.

Preferred membership of task force	Long Island Zone		Northeastern Zone		Southeastern Zone		Western Zone	
	Most avid (n = 48)	Less avid (n = 289)	Most avid (n = 63)	Less avid (n = 375)	Most avid (n = 39)	Less avid (n = 407)	Most avid (n = 36)	Less avid (n = 381)
Only casual hunters	2.2	2.1	0.0	1.3	5.0	2.5	2.2	1.8
Mostly casual with some avid hunters	2.2	4.6	4.9	4.5	2.5	4.2	2.2	5.2
Equal casual and avid hunters	15.6	31.2	19.7	36.7	20.0	35.0	15.2	35.7
Mostly avid with some casual	22.2	29.1	24.6	33.0	15.0	33.3	37.0	31.5
Only avid hunters	57.8	33.0	50.8	24.5	57.5	25.1	43.5	25.7

Table 16. Percentages of duck hunters from various waterfowl management zones in New York State, by level of duck-hunting avidity, indicating whether they preferred representatives of season-setting task forces to be only duck hunters with "lots of experience", only hunters with "little experience," or some combination, based on a mail survey conducted in 2005.

Preferred membership of task force	Long Island Zone		Northeastern Zone		Southeastern Zone		Western Zone	
	Most avid (n = 48)	Less avid (n = 289)	Most avid (n = 63)	Less avid (n = 375)	Most avid (n = 39)	Less avid (n = 407)	Most avid (n = 36)	Less avid (n = 381)
Only hunters with "lots of experience"	57.1	38.0	51.6	28.9	53.8	32.3	37.0	31.1
Mostly "lots of experience" and some with "little experience"	20.4	31.0	37.1	34.0	20.5	35.5	34.8	32.4
Equal "lots" and "little" experience	10.2	21.6	8.1	28.9	17.9	23.6	19.6	28.4
Mostly "little experience" and some with "lots of experience"	4.1	6.6	0.0	5.9	2.6	5.9	4.3	5.8
Only hunters with "little experience"	8.2	2.8	3.2	2.4	5.1	2.7	4.3	2.4

Table 17. Percentages of duck hunters from various waterfowl management zones in New York State, by level of duck-hunting avidity, indicating whether they preferred representatives of season-setting task forces to be only hunters affiliated with waterfowl associations or other organized sportsmen's groups, only unaffiliated hunters, or some combination, based on a mail survey conducted in 2005.

Preferred membership of task force	Long Island Zone		Northeastern Zone		Southeastern Zone		Western Zone	
	Most avid (n = 48)	Less avid (n = 289)	Most avid (n = 63)	Less avid (n = 375)	Most avid (n = 39)	Less avid (n = 407)	Most avid (n = 36)	Less avid (n = 381)
Only hunters affiliated with waterfowl associations	37.0	22.7	21.0	21.8	35.9	27.4	15.2	22.5
Mostly affiliated hunters with some unaffiliated hunters	19.6	24.5	24.2	18.7	25.6	20.7	26.1	23.0
Equal affiliated and unaffiliated hunters	28.3	41.6	37.1	45.2	28.2	39.8	43.5	43.3
Mostly unaffiliated hunters with some affiliated hunters	8.7	8.0	11.3	8.2	2.6	7.9	4.3	7.0
Only unaffiliated hunters	6.5	3.1	6.5	5.1	7.7	4.2	10.9	4.2

How Should Task Force Representatives Get Input For Making Decisions?:

Preferences of very avid duck hunters. Majorities of avid duck hunters in the Long Island, Northeaster, and Southeastern zones "definitely" preferred five of seven possible methods we examined through which task force representatives could obtain input for recommending season dates (Table 18). Being able to attend task force meetings was preferred the most in all zones by very avid hunters[1]. Majorities in all zones also "definitely" preferred to provide task force representatives with input via the U.S. mail. Having DEC conduct scientific surveys, and allowing hunters to provide input via e-mail and telephone also were preferred highly.

Allowing task force representatives to base their decisions on their own experiences generally was not preferred in any zone. Allowing representatives to ask their hunting friends for input also was not supported, except in the Southeastern Zone, where nearly one-half of very avid hunters responded "definitely yes" to this idea. Indeed, this was the only possible method of obtaining input for which we found differences in the proportional distribution of responses among the zones (X^2 = 18.393, df = 9, p = 0.031).

Preferences of less-avid duck hunters. Fewer less-avid duck hunters in all zones, compared to very avid hunters in the same zone, responded "definitely yes" to any of the 7 possible methods we examined. Still, 40-53% of less-avid hunters in all zones said "definitely yes" to allowing duck hunters to attend task force meetings, having DEC sponsor scientific surveys of hunters, and allowing hunters to provide written comment by U.S. postal mail or e-mail (Table 19). Overall, fewer less-avid hunters in all zones, compared to very avid hunters in those zones, were negative toward allowing task force representatives to base decisions about season dates on their own experience or on input from their hunting friends.

What Kinds Of Information Should Task Force Representatives Consider?:

Preferences of very avid duck hunters. Very avid duck hunters in all zones overwhelmingly preferred task force representatives to consider when ducks are most abundant for setting season dates (Table 20). A majority (57%) of very avid hunters in the Long Island Zone also preferred that representatives consider when the greatest number of avid hunters can hunt. When the greatest number of all duck hunters can hunt was preferred by only one-fifth to one-fourth of very avid hunters in any zone, except the Long Island Zone where 42% also said task force representatives should "definitely" consider this kind of information. When the greatest number of youth can hunt generally was not preferred by very avid hunters in any zone.

Preferences of less-avid duck hunters. Like very avid hunters, less-avid hunters preferred that task force representatives consider when ducks usually are most abundant when recommending season dates to DEC (Table 21). Between 20-28% of less-avid duck hunters in each of the zones preferred that task force representatives consider when the most hunters can hunt. Relatively few less-avid hunters in any zone wanted Task Force representatives consider either when the greatest number of avid hunter can hunt, or when the most youth can hunt.

[1] When the Task Forces were first conceived the idea was considered to allow any interested hunter to attend. However, this was deemed infeasible due to time constraints, and other methods of providing input are available to all hunters.

Table 18. Percentages of very avid duck hunters from various waterfowl management zones in New York State indicating their preferences for different methods through which representatives of season-setting task forces could obtain input for making decisions, based on a mail survey conducted in 2005.

Possible ways for TF reps to get input	Very avid duck hunters Long Island Zone (n = 52) Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Very avid duck hunters Northeastern Zone (n = 64) Definitely yes	Probably yes	Maybe yes	≥ Maybe no
Duck hunters attend TF meetings	60.8	25.5	9.8	3.9	65.6	17.2	9.4	7.8
DEC sponsor scientific surveys	58.8	15.7	19.6	5.9	59.4	18.8	15.6	6.3
Duck hunters write via U.S. mail	61.5	28.8	9.6	0.0	51.6	28.1	17.2	3.1
Duck hunters e-mail TF members	54.0	36.0	6.0	4.0	54.7	23.4	18.8	3.1
Duck hunters phone TF members	51.0	24.5	14.3	10.2	51.6	23.4	14.1	10.9
Ask hunting friends[2]	31.4	23.5	19.6	25.5	41.3	33.3 (+)	22.2	3.2 (-)
Base decision on own experience	21.2	26.9	15.4	36.5	18.8	31.3	28.1	21.9

[2] Preferences for "ask hunting friends" differed among zones for very avid duck hunters. $X^2 = 18.393$, df = 9, p = 0.031.

Table 18. Continued.

Possible ways for TF reps to get input	Very avid duck hunters Southeastern Zone (n = 41) Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Very avid duck hunters Western Zone (n = 46) Definitely yes	Probably yes	Maybe yes	≥ Maybe no
Duck hunters attend TF meetings	65.9	17.1	12.2	4.9	60.9	19.6	10.9	8.7
DEC sponsor scientific surveys	55.0	32.5	5.0	7.5	47.8	21.7	23.9	6.5
Duck hunters write via U.S. mail	65.9	19.5	9.8	4.9	54.3	23.9	13.0	8.7
Duck hunters e-mail TF members	61.0	22.0	12.2	4.9	47.8	30.4	13.0	8.7
Duck hunters phone TF members	61.0	14.6	14.6	9.8	47.8	26.1	14.6	9.8
Ask hunting friends[3]	48.8 (+)	14.6 (-)	17.1	19.5	28.3 (-)	26.1	19.6	26.1
Base decision on own experience	20.0	17.5	32.5	30.0	17.4	21.7	19.6	41.3

[3] Preferences for "ask hunting friends" differed among zones for very avid duck hunters. $X^2 = 18.393$, df = 9, p = 0.031.

Table 19. Percentages of less-avid duck hunters from various waterfowl management zones in New York State indicating their preferences for different methods through which representatives of season-setting task forces could obtain input for making decisions, based on a mail survey conducted in 2005.

Possible ways for TF reps to get input	Less avid duck hunters Long Island Zone (n = 298)				Less avid duck hunters Northeastern Zone (n = 383)			
	Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Definitely yes	Probably yes	Maybe yes	≥ Maybe no
Duck hunters attend TF meetings	50.7	29.9	13.8	5.7	50.4	28.2	16.7	4.7
DEC sponsor scientific surveys	53.4	27.9	14.8	4.0	43.2	30.5	19.3	7.0
Duck hunters write via U.S. mail	47.1	28.3	17.2	7.4	43.6	30.5	18.3	7.6
Duck hunters e-mail TF members	43.7	30.5	18.0	7.8	40.1	34.3	17.8	7.9
Duck hunters phone TF members	35.5	28.0	19.3	17.2	34.6	31.8	19.0	14.6
Ask hunting friends	25.3	30.7	25.3	18.6	27.8	33.2	25.3	18.6
Base decision on own experience	16.1	32.6	30.9	20.5	16.4	26.9	35.0	21.7

Table 19. Continued.

Possible ways for TF reps to get input	Less avid duck hunters Southeastern Zone (n = 407) Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Less avid duck hunters Western Zone (n = 385) Definitely yes	Probably yes	Maybe yes	≥ Maybe no
Duck hunters attend TF meetings	44.1	34.4	15.1	6.3	47.4	30.1	16.6	6.0
DEC sponsor scientific surveys	50.8	27.4	16.7	5.1	43.8	30.1	17.6	8.5
Duck hunters write via U.S. mail	45.0	30.8	26.9	7.1	46.0	28.1	17.9	8.1
Duck hunters e-mail TF members	44.4	25.6	22.0	8.0	44.3	31.6	17.6	6.5
Duck hunters phone TF members	33.4	28.7	22.9	15.0	32.4	31.6	21.2	14.8
Ask hunting friends	26.0	34.1	25.7	14.2	26.7	27.7	31.9	13.7
Base decision on own experience	18.9	28.0	29.5	23.6	17.4	30.1	33.5	19.0

Table 20. Percentages of very avid duck hunters from various waterfowl management zones in New York State indicating their preferences for the kinds of data to be considered by representatives of season-setting task forces, based on a mail survey conducted in 2005.

Possible data for TF reps to consider	Very avid duck hunters Long Island Zone (n = 59) Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Very avid duck hunters Northeastern Zone (n = 109) Definitely yes	Probably yes	Maybe yes	≥ Maybe no
When ducks are most abundant	69.8	20.8	7.5	1.9	71.9	17.2	9.4	1.6
When the most hunters can hunt	42.3	21.2	23.1	13.5	27.7	32.3	26.2	13.8
When most avid hunters can hunt	57.4	20.4	11.1	11.1	43.8	37.5	15.6	3.1
When most youth can hunt	9.4	28.3	28.3	34.0	17.2	17.2	34.4	31.3

Possible ways for TF reps to get input	Very avid duck hunters Southeastern Zone (n = 104) Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Very avid duck hunters Western Zone (n = 90) Definitely yes	Probably yes	Maybe yes	≥ Maybe no
When ducks are most abundant	69.2	17.9	7.7	5.1	70.2	21.3	4.3	4.3
When the most hunters can hunt	25.6	41.0	23.1	10.3	20.0	42.2	13.3	24.4
When most avid hunters can hunt	42.1	23.7	26.3	7.9	28.3	41.3	23.9	6.5
When most youth can hunt	30.0	22.5	17.5	30.0	15.2	26.1	19.6	39.1

Table 21. Percentages of less-avid duck hunters from various waterfowl management zones in New York State indicating their preferences for the kinds of data to be considered by representatives of season-setting task forces, based on a mail survey conducted in 2005.

Possible data for TF reps to consider	Less avid duck hunters Long Island Zone (n = 185) Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Less avid duck hunters Northeastern Zone (n = 229) Definitely yes	Probably yes	Maybe yes	≥ Maybe no
When ducks are most abundant	61.1	25.7	10.2	3.0	58.7	27.9	10.8	2.6
When the most hunters can hunt	19.7	33.1	30.4	16.7	28.1	33.2	29.1	9.5
When most avid hunters can hunt	24.7	38.3	25.3	11.7	19.3	40.6	26.7	13.4
When most youth can hunt	12.7	22.7	35.8	28.8	15.8	25.3	32.6	26.4

Possible ways for TF reps to get input	Less avid duck hunters Southeastern Zone (n = 226) Definitely yes	Probably yes	Maybe yes	≥ Maybe no	Less avid duck hunters Western Zone (n = 235) Definitely yes	Probably yes	Maybe yes	≥ Maybe no
When ducks are most abundant	54.3	28.1	13.7	3.8	60.1	28.4	9.2	2.3
When the most hunters can hunt	25.2	30.0	32.7	12.1	23.1	32.6	30.3	13.9
When most avid hunters can hunt	21.2	34.3	29.2	15.3	19.9	34.6	30.7	14.7
When most youth can hunt	18.5	24.9	32.4	24.1	16.7	25.7	35.7	21.9

DISCUSSION

Preferences For Season Dates Reflect Importance Of Hunter-Duck Interactions

In all 4 major waterfowl management zones, preferences for season dates reflected the interests of hunters to have some positive effects of hunter-duck interactions managed at desirable levels. In particular, hunters prefer to have the duck-hunting season open when they believe ducks are most abundant, presumably so they would be most likely to see many ducks in general, to have the best chance to take their favorite kinds of ducks, or to have the best weather for hunting ducks. Of less importance are reasons linked to duck hunters' decisions about whether to hunt ducks, like potential conflicts with other hunting seasons, or the complementary opportunity to hunt geese simultaneously with ducks.

Preferences for opening day to be on a week day were related to hunters' interests in having some negative effects of hunter-hunter interactions managed at tolerable levels. Most waterfowl management decisions by wildlife agencies do not focus on managing the effects of hunter-hunter interactions, except for regulations on a very limited number of public lands (e.g., Glass and More 1992). Instead, the explicit focus of management decisions at the Flyway level (and by default at the state [not local] level because state-level decisions must be made within the regulatory package adopted by the Flyway) is to maximize harvest over the long-term as the most important effect of hunter-duck interactions (e.g., Johnson and Williams 1999).

Despite this explicit focus on harvest as the management objective of waterfowl management, effects of non-harvest interactions long have been documented as being more important than harvest. Vaske et al. (1986) reported very high correlations between satisfaction with a goose-hunting trip and non-harvest variables (i.e., being outdoors, using waterfowl hunting skills). Correlations were much lower between satisfaction and either harvesting waterfowl, or hunter-hunter interactions (i.e., seeing friends harvest geese, experiencing crowding, witnessing unethical hunting behavior). Although most goose hunters in the Vaske et al. study "wished they had harvested more birds" (many had harvested none), the number of geese harvested had no statistically significant influence on satisfaction with the trip. Rather, the number of geese seen within shooting range and perceived crowding (a negative effect of seeing other hunters) were statistically significant influences on satisfaction with a hunting trip.

Schroeder et al. (2006) reported that the most important, desired experience outcomes of Minnesota duck hunters were: (1) "enjoying nature," (2) "good behavior of other hunters," (3) "getting away from crowds," and (4) "seeing a lot of ducks and geese." Conversely, "getting your limit," "having a large bag limit," and "bagging ducks and geese" were among the least-important experiences for Minnesota duck hunters. Similarly, reasons reported by duck hunters in New York in 1989 for their preferences to hunt on either private or public lands were related more to minimizing negative effects of hunter-hunter interactions (e.g., crowding, sky-busting by other hunters, or other hunters shooting at ducks attracted to my decoys) than they were to maximizing hunters' opportunities to see or harvest ducks (Enck and Decker 1990:27-31).

Preferences of active New York duck hunters for season dates they believe will maximize interactions with total numbers of ducks or specific types of ducks may reflect the universality of enjoying, or "being connected to," nature (i.e., a possible positive impact associated with a high number of interactions with ducks). Preferences for opening the season on a week day similarly may

reflect a commonly held desire to minimize "crowding" and other forms of interference from other hunters (i.e., a possible negative impact associated with interactions among hunters). These interpretations could be verified or refuted, and other impacts identified, through stakeholder involvement directed at understanding the structure of the system of interactions and effects that hunters want managed.

Identifying and verifying these impacts is vital to the success of management. Hunters who differ in terms of duck-hunting avidity or commitment, or in use of particular hunting techniques or habitats may identify different impacts to be managed. Enck et al. (1993) reported that among continuous duck hunters, those with high-commitment to duck hunting, compared to those with low-commitment, had different criteria for judging whether to take shots at ducks they considered to be in-range. Even preferences for particular hunting styles explicitly reflected interest in different effects of those styles. Shooting birds over decoys was preferable to jump shooting or pass shooting for some hunters because of (1) the skill required to call-in and decoy birds, (2) improved opportunity to identify sex or species of ducks so the hunter can conserve (i.e., not shoot) less-abundant species, and (3) decreased likelihood of crippling and "wasting" ducks. Thus, hunters likely will evaluate management success differently based on whether they experience desirable/tolerable levels of impacts they associate with hunter-duck interactions, not simply the magnitude of harvest, per sé.

How Do New York Duck Hunters In 2005 Compare To Duck Hunters In 1990?

"Active" New York State duck hunters in 2005 exhibited behaviors comparable to "continuous duck hunters"[4] characterized by Enck and Decker (1990) 15 years earlier. In 2005 "active" duck hunters had hunted ducks for an average of 4.4 years out of the previous five years. Most duck hunters from both time periods indicated their interest in duck hunting over the previous five years had either not changed or had increased. The vast majority of hunters in 2005 indicated they intended to hunt in the upcoming season, similar to the intentions of both "continuous" and "sporadic" duck hunters in 1989 who, by definition, intended to hunt ducks again "in the future."

The kinds of waterfowl and habitats hunted most frequently by duck hunters in 1989 and 2005 were similar, with only minor exceptions. In both years, about one-half of duck hunters were characterized primarily as "dabbling duck hunters" (54% and 49% in 1989 and 2005, respectively). In 2005, there was a higher percentage of "generalists" with respect to the type of waterfowl hunted (29% vs. 22% in 1989). About one-fifth of duck hunters in both years were characterized primarily as "goose hunters" (22% in 1989 and 18% in 2005), and few in either year were characterized primarily as "diving duck hunters" (2% in 1989 vs. 4% in 2005).

"Shallow water hunters" dominated the duck hunter population in both years, although the percentage decreased slightly between 1989 (58%) and 2005 (48%). The percentage of "deep water hunters" increased from 11% in 1989 to 19% in 2005. In both years, 13-18% of hunters were characterized primarily as "field hunters," or "generalists" who hunted in various habitats.

We found changes in the types of properties accessed for hunting. Compared to 1989, fewer hunters in 2005 hunted primarily on private land for free (51% in 1989 vs. 45% in 2005). The percentage of hunters who hunted primarily on public land increased from 36% in 1989 to 40% in

[4] Enck and Decker (1990) defined "continuous duck hunters" as persons who (1) had hunted ducks sometime prior to 1987, (2) had hunted ducks in both 1987 and 1988, and (3) intended to hunt ducks after 1988.

2005. In both years, few hunters hunted primarily on private land for a fee (3-4%) or were characterized as "access generalists" (9-12%).

Although changes in the opportunity to hunt ducks between 1989 and 2005 (e.g., season length, daily bag limit, species limits) make some comparisons difficult, we found surprising similarities in the average number of days hunted per year. "Continuous duck hunters" from the 1989 study had hunted ducks for an average of 12 days in both 1987 and 1988. In 2005, "active duck hunters" reported that they hunted ducks for an average of 11 days in 2004. The lack of any measurable change in the number of days hunted supports findings from various studies showing that season length has relatively little effect on overall satisfaction and ultimately participation compared to the timing of hunting seasons (i.e., season dates [Enck et al. 1993, Ringleman 1997, National Flyway Council and Wildlife Management Institute 2006]).

Few "active duck hunters" in 2004 took advantage of a "Youth Waterfowl Hunting Weekend" (11% total, with most participants being adult sponsors). This is consistent with the low participation (12%) by hunters from the Lake Champlain Zone in 2003 (Brown and Enck (2004). These weekends seem to have a very limited influence on recruitment and retention of waterfowl hunters in New York. Brown and Enck reported that 17.5% of VT hunters in that state's Lake Champlain Zone had participated in a Youth Weekend in 2003. Schroeder et al. (2006) reported that 12-30% of Minnesota duck hunters (depending on the typology) participated in a Youth Weekend in that state in 2000.

Can Findings From This Study Be Augmented With Findings From The 2005 National Duck Hunter Survey?

Characteristics of hunters from this study were nearly identical to those from another, independent sample of duck hunters drawn from the same pool (i.e., persons who hunted ducks in New York in 2004) as part of a 2005 national duck hunter study (National Flyway Council and Wildlife Management Institute 2006). Among respondents to the national survey, 422 indicated that they had hunted in New York the previous year and/or that New York was the state most important to them for duck hunting. Hunters from both samples had hunted about the same number of years during the previous five (4.4 in this study vs. 4.7 for New York hunters in the national survey). Similar proportions reported that duck hunting was their "most important recreational activity" (11% for this survey vs. 12% for New York hunters in the national survey), "one of my most important..." (62% vs. 62%), "no more important than other recreational activities" (24% vs. 22%), and "one of my least important recreational activities" (2% vs. 4%). Similarly, nearly identical proportions indicated that they had started hunting ducks in the various time periods about which we inquired (see Table 3 for results from this study).

Similarities between the two samples of New York duck hunters drawn in 2005 reflect the adequacy of our sampling strategy. The similarities also provide an opportunity for waterfowl biologists to analyze data from New York respondents to the national survey as a supplement to data from this study. The national survey contained several questions pertaining to timing of the duck season (National Flyway Council and Wildlife Management Institute 2006). About one-third of those respondents each reported they were "satisfied" with the timing of the duck-hunting season in 2004 (32%), were "neutral" toward the timing of season (35%), or were dissatisfied (33%). Slightly more than one-half (56%) indicated that the timing of the season had neither gotten better nor worse over the previous several years, 14% said the timing had gotten better, but 30% said it had gotten worse. That twice as many hunters evaluated the timing of the season as worse compared to better –

despite no substantial changes in dates – reflects the need for, and utility of, season preference data described in this report.

CONCLUSIONS AND IMPLICATIONS

Support For Concept Of Using Task Forces Is Consistent With An AIM Approach To Decision-making

Because very avid and less avid duck hunters may value a particular interaction or effect for different reasons, identification of impacts to be managed necessarily should be linked to improving understanding of why they desire particular management outcomes (Bosch et al. 2003). A collaborative environment conducive to social learning among hunters and duck biologists is most useful to elicit that information (Schusler et al. 2003). Social learning occurs in well-facilitated discussions among a group of stakeholders that enhance common knowledge, awareness of issues important to various stakeholders, and understanding about why those issues are important. Greatest benefit can be gained when stakeholders are "...thinking, discussing, and acting together" (Borrini-Feyerabend et al. 2000:12) through a process of interactive learning because no one individual has all the answers (Wondolleck and Yaffee 2000).

In a social learning environment, ecological knowledge, such as the relative timing of migration and its influence on duck abundance and species diversity, as well as recruitment and mortality rates, may be necessary but insufficient data for the stakeholders to consider. Also needed is an understanding of duck hunters' knowledge systems (Lal et al. 2001, Bosch et al. 2003) – what they think they know about interactions between themselves and ducks and with other hunters – that in turn, influence their behaviors and their hunting satisfaction. Such input from hunters, combined with expert knowledge from duck biologists, can be used to create a more complete model of the system of factors which influence the levels of the identified impacts.

In this study, support for the use of hunter task forces to recommend season dates provides an excellent opportunity for the needed collaborative learning environment. Preferences for task force membership to include DEC biologists as well as a diversity of types of duck hunters also are consistent with the notion of using task force meetings as an opportunity for collaborative learning. Further, respondents to the survey generally did not want task force members to base recommendations about season dates only on their own experiences. Rather, they preferred that all hunters could provide input through a variety of mechanisms.

Such an approach has been used successfully in New York in the context of managing impacts associated with white-tailed deer (*Odocoileus virginianus* [Enck et al. 2003]) and black bears (*Ursus americanus* [New York State Department of Environmental Conservation 2003]). In both cases, biologists first identified impacts to be managed using input from stakeholder groups. Then they developed models of the system of factors that affect those impacts, including hypotheses about feedback loops in the models. Deer biologists discussed the models with landowners and hunters to identify and examine stakeholders' assumptions about factors affecting their own perceptions and behaviors, and to develop innovative ideas about what actions might be necessary to achieve desirable or tolerable levels of impacts. Bear biologists used their model to simulate the effects of additional field staff, public education efforts, and bear hunting on the relative number of complaints the agency receives from the public about negative interactions with bears in residential areas (Siemer and Otto 2005).

Task Force Members Could Provide Expert Opinion About The Dynamic System Of Factors That Influence Impacts To Be Managed

An important outcome of the modeling efforts described above was an explicit description of ecological and social "sideboards" on the wildlife systems being managed. The main purpose of describing those conceptual models was to build a shared understanding of the management systems among the stakeholder involved, not to predict or simulate model outcomes (although simulation ultimately was conducted to assist decision-making for bear management). A benefit of involving stakeholders in development of mental models of the systems to be managed was revelation of variability in stakeholders' (and biologists') assumptions about the system and how it operates to influence levels of impacts.

The deer (Enck et al. 2003) and bear (Siemer and Otto 2005) case studies mentioned above revealed that stakeholders have a hard time, initially, describing impacts they would like managed. For that reason, a fruitful approach for the use of preference data by task forces charged with recommending season dates would be to have a trained facilitator start the collaborative learning discussion with a description and "picture" (i.e., mental model) of the set of hunter-duck interactions that must occur for ducks to be harvested. Such a model necessarily would be simplistic, except that it would include main findings from this study about the relationship between reasons underlying preferences for season dates and important hunter-duck interactions from seeing to harvesting ducks (Figure 13).

With a conceptual foundation based on tangible and desirable experiences of duck hunters (i.e., seeing and harvesting ducks), the facilitator then could ask task force members to improve upon the model by identifying missing elements (e.g., hunter-hunter interactions), feedback mechanisms (e.g., effect of shooting intensity on duck observability), and other factors that affect hunters' behavioral choices in terms of their intentions to go duck hunting, or their intentions to shoot at ducks that are in-range. Specifically, task force members could be asked: (1) how would a change in season dates affect the interactions depicted in this model? (2) would any identified change add to, or detract from, your hunting satisfaction?, and (3) why would it influence your satisfaction?

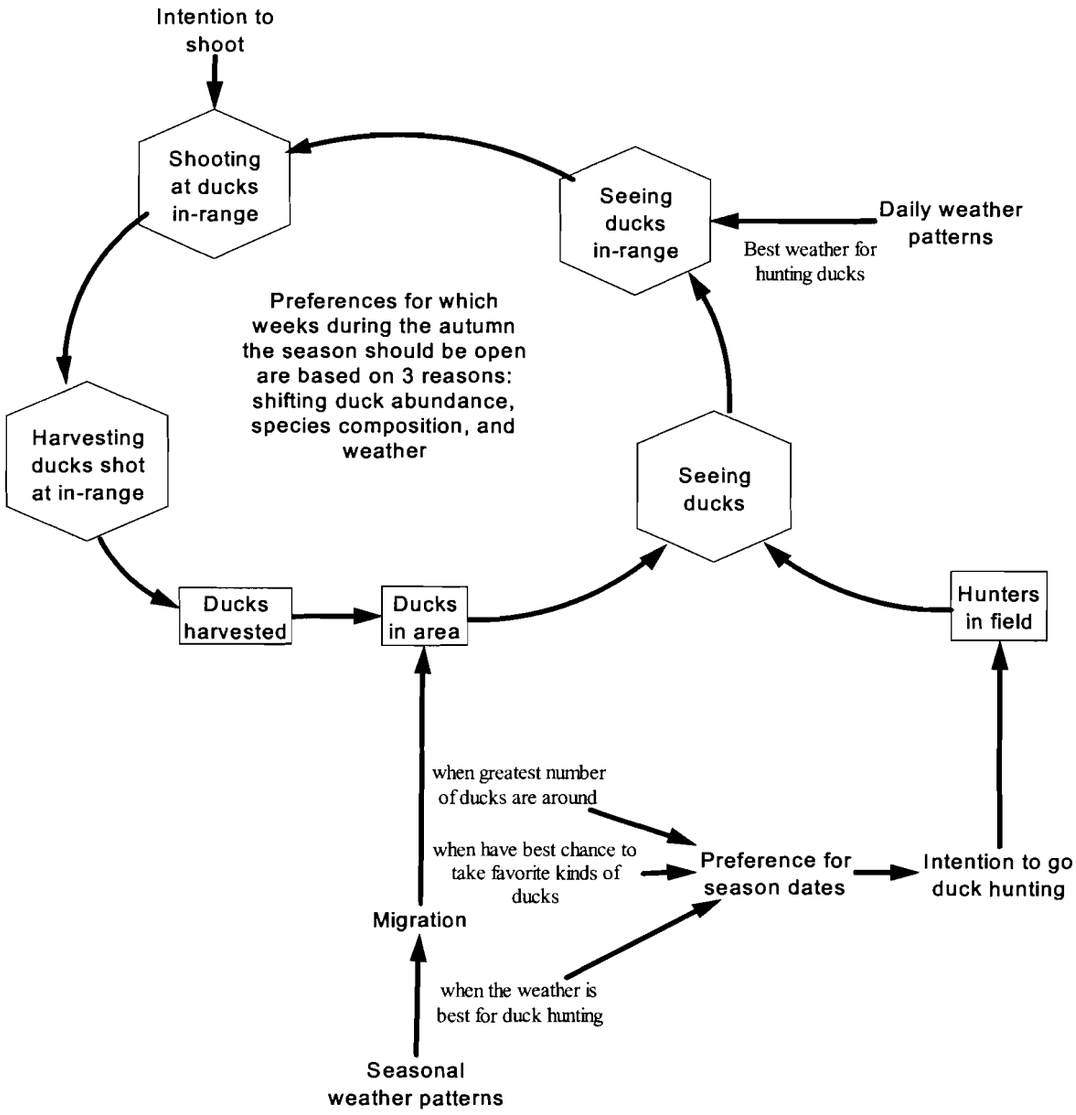


Figure 11. Conceptual model of hunter-duck interactions leading to duck harvest, and including the main findings linking reasons why hunters prefer particular season dates to this set of hunter-duck interactions.

An Example Using Data From Western Zone Hunters:

Recall that peaks in preference indices exist for the Western Zone (2nd and 3rd weeks in October [O2 and O3] and 4th week in December and 1st week in January [D4 and J1]). Further, the hunters preferring the earlier time period largely are different from those preferring the latter period. However, 66-73% of respondents who prefer the earlier time period said a very important reason for their preference is "when the most ducks are around," and a similar 68-69% of hunters who prefer the later time period gave the same reason. What needs to be clarified is whether the different hunters have different beliefs about when duck abundance is highest, or whether this could be habitat related – perhaps those who prefer earlier time periods hunt in shallower water that freezes earlier and those who prefer the latter period hunt in deeper water less prone to freeze and where ducks may concentrate later in the season.

Similarly, most older hunters (and about one-half of younger and mid-aged hunters) from the Western Zone said that "best chance to take favorite kinds of ducks" was very important early (mid October) and many who preferred later season (D4-J1) gave the same reason. What is unknown is whether their favorite ducks reflect different types (dabblers vs. divers) or species (Wood Ducks vs. Widgeon? Or do some hunters really believe their favorite species (e.g., Mallard) is most abundant during O2 and O3 while others believe the species is most abundant during D4 and J1? Alternatively, do these results reflect weather-related differences in vulnerability of ducks – perhaps many birds are actually in the area early, but are less prone to decoy until later.

The reason "when I have time to hunt" seems fairly straight-forward. However, the other 3 main reasons: "when the most ducks are around," "when I have the best chance to take my favorite kinds of ducks," and "when the weather is best for duck hunting" all have various possible meanings. Depending on which meaning(s) are correct, the kind of information Task Force members would need to make the best possible decisions about season dates could differ (Table 22). These meanings could be explored in detail through a facilitated, social-learning opportunity provided to Task Force members.

What do hunters mean by "when the most ducks are around" and why is this important? After some insights are generated through a general discussion, a more directed discussion could lead Task Force members through the set of numbered questions such as those shown in Table 22, to increase understanding about these possible reasons why "when the most ducks are around" is so important to hunters. For example, is duck abundance really important (question #1), or is it that hunters use duck abundance as an index to the kinds of experiences listed in questions #2 through #4? That is, the more ducks that are around increase the odds of seeing ducks and having a chance to shoot them – all other things being equal.

Further, if Task Force members believe that duck abundance actually is most important, discussion then could be focused on what they believe the effects would be on #2 through #4 under different abundance scenarios (e.g., 5,000 ducks estimated to be in the Zone on a given day vs. 50,000 ducks estimated to be in the Zone on given day). Would any of #2 through #4 change appreciably under those scenarios? If the answer is "it depends on weather, access, types of habitats, techniques, etc., then duck abundance probably is not THE most important factor.

Table 22. Different kinds of ecological and social data would be needed to make decisions about the timing of the duck-hunting season, depending on various interpretations of what hunters mean by "when the most ducks are around."

Possible interpretations	ecological data needed	social data needed
1. are ducks really around the area?	a. duck abundance b. timing of migration	a. how do hunters become aware that ducks are around?
2. are the ducks that really are around also being seen?	a. observability of ducks	a. observability by hunters
3. are ducks that generally are in the area, also occurring in places being hunted?	a. distribution of ducks across landscape	a. widespread access vs. refugia in posted wetlands other otherwise inaccessible areas
	b. timing of freeze-up	b. habitats hunted/preferred
	c. probability of ducks flying past pass-shooters is highest when abundance is greatest	a. techniques used (e,g,, decoys vs. pass-shooting)
4. are ducks in the places being hunted also reasonably vulnerable to harvest?	a. probability of ducks responding to calls or decoys is highest when duck abundance is greatest	a. probability of interference from other hunters is lowest when duck abundance greatest

Outcomes of the discussion outlined above could have direct applicability to management decisions. For example, should DEC devote scarce resources to estimating duck abundance by time period over the course of possible hunting season dates? If duck abundance is indeed vitally important, then spending resources to estimate duck abundance by time period would seem warranted. If #2 through #4 are more important (i.e., one of these is the "real" definition of "when the most ducks are around") then resources might be better spent on collecting the kinds of information listed for that question in the table above.

Using A Model Improved By Task Force Members To Identify Impacts To Be Managed And Data Collection Needs

Answering the "why" question posed above could help identify specific impacts to be managed. For example, the importance of having the season open when the most ducks will be around suggests that "being connected to nature" could be a positive impact to be managed. Similarly, the importance of opening the season on a weekday suggests that "interference from other hunters" might be a negative impact to manage. Further, knowledge that hunters desire to bag some waterfowl, but that filling their limit is not critical, suggests there is a desirable level of "sufficiency of harvest." Obviously, more information is needed about the impacts to be managed, especially desired/tolerated levels compared to experienced levels.

Discussing with task force members about how a change in season dates might affect the interactions depicted in the model could produce an explicit description of hunters' assumptions about model structure (i.e., the system to be managed). For example, suppose hunters assume that seeing ducks (i.e., the number of times ducks are seen per unit of hunter effort) is directly linked to duck abundance (i.e., when the most ducks are around). Although this may seem logical, one could consider experiential evidence that different hunters do not have the same number of visual encounters with ducks, under any given abundance or density of ducks in a local area. Other factors such as a hunter's observation skills or style of hunting (using decoys vs. pass shooting) could result in substantially different numbers of sightings per unit effort. What might the implications of that evidence be on preferences to have the season open "when the most ducks will be around"?

Expert facilitation also could explicitly identify alternative hypotheses about factors that influence important relationships in the model. For example, one could hypothesize that hunters' intentions to shoot when ducks are in-range mostly are influenced by the nature of the interaction (e.g., species or sex of ducks that is seen in-range). Alternatively, intentions to shoot when the opportunity exists could be influenced most by interference from, or other effects of, hunter-hunter interactions. A third hypothesis could be that intentions to shoot are influenced the most by the size of the daily bag limit and how close the hunter is to filling the bag.

Perhaps more important, the closer a hunter is to filling his bag limit could either increase or decrease his intention to shoot at ducks that are in-range. If harvest results in elevated status for the hunter ("i.e., expertness"), then his intention to shoot might increase as he becomes closer to filling his limit. In essence, the hunter might become less selective to gain status or ducks to eat. Alternatively, the hunter might become more selective to extend time in the field if he already has reached some desired, sufficient level of harvest for the day (or season). By explicitly describing such hypotheses and implementing management interventions to test them, one could determine whether lower bag limits might be associated with hunters being more selective, or less selective, in terms of taking shots when the have an in-range opportunity.

Also, some concern has been expressed by waterfowl managers (B. Swift, New York State Department of Environmental Conservation, personal communication, 9 August 2006) that the current daily bag limit of 6 total ducks, with no more than four of those being mallards, results in higher harvest pressure on non-mallard species than would occur if the total bag limit was 4 ducks per day, and an additional mallard-only season were held. Under a reduced bag with an extended mallard-only scenario, what changes might hunters expect in the hunter-duck interactions described in the basic model and its feedback structures? How would levels of desirable or tolerable effects of

those interactions change? For example, during the extended, mallard-only season, hunters probably would have many in-range interactions with ducks/flocks in-range that they could not shoot at because they were not mallards. However, hunters may have more total encounters with ducks/flocks (including those not in-range) because birds that would have been harvested or made more wary by shooting pressure will continue flying around the area.

Similarly, what changes in interactions could be expected during that part of the season when non-mallard species were legal? The finding that hunters want the season to be open when they have the best chance of taking their favorite kinds of ducks suggests that hunters do not want to harvest just "a lot of ducks," but rather the "right kinds of ducks." Thus, could hunters be expected to continue taking shots at the same proportion of in-range encounters with all ducks until they limit out, or would hunters become more selective for mallards for some reason? Potential answers to these questions could be discerned with more confidence if managers used the task forces to develop a clearer understanding of the factors affecting hunters' intentions to shoot at ducks that are in-range. Subsequent to development of the conceptual models using task forces, scientific surveys could be used to assess current levels of impacts compared with desirable or tolerable levels (e.g., as in the concept of wildlife stakeholder acceptance capacity [Carpenter et al. 2000]).

Engaging Task Force Members Can Help Reduce Uncertainty In Management

A key characteristic of adaptive management is explicit recognition of uncertainty about ecosystem components and their management (Walters 1986, Lancia et al. 1993, Williams 1997). Several kinds of uncertainty affect success of adaptive management. *Environmental variation* can unexpectedly influence ecological processes and human behavior from year to year and place to place. *Partial observability* is the inability to measure precisely the attributes of the management system, whether numbers of wildlife, harvest rates, or human intentions and behaviors. *Partial controllability* is a lack of predictability between management actions and an expected change in measured objectives. *Structural uncertainty* is a limited understanding of relationships among components of the management system. By designing management actions to test (i.e., support or refute) hypotheses about how best to achieve management objectives, all kinds of uncertainty, except environmental variation, can be reduced (Walters 1986).

This study has been an initial step toward reducing some of these kinds of uncertainty by shedding light on how duck hunters think about the *duck management system*; that is, the system of interactions between themselves and ducks, and among duck hunters in the field. In particular, we gained insights about hunters' perceptions of how season dates might influence interactions among components of that system and thus change the nature and magnitude of some of the important effects of those interactions. Building on the knowledge gained through this study, task forces could be used to further reduce structural uncertainty, focus data collection needs to improve partial observability, and recommend management interventions that reduce uncertainty associated with partial controllability.

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APPENDIX A: 2005 NEW YORK STATE DUCK HUNTER SURVEY

GENERAL DUCK HUNTING EXPERIENCES

1. When did you start hunting ducks? (Check one choice.) [Same as national survey]

___ Before 1970
___ 1970 to 1979
___ 1980 to 1988
___ 1989 to 1996
___ 1997 to 2004

2. How many of the last 5 years have you hunted ducks? (Check one choice.)
[Same as national survey]

___ 0 ___ 1 ___ 2 ___ 3 ___ 4 ___ 5

3. During the 2004-2005 season, how many days did you hunt ducks in each of the following Waterfowl Management Zones in New York State, and how many ducks did you bag in each Zone? (If none, write in 0.)

Long Island Zone	___ days	___ ducks
Lake Champlain Zone	___ days	___ ducks
Southeastern Zone	___ days	___ ducks
Northeastern Zone	___ days	___ ducks
Western Zone	___ days	___ ducks

4. Do you intend to hunt ducks during the upcoming 2005-2006 hunting season?

___ No ___ Yes

SPECIFIC DUCK HUNTING EXPERIENCES

The following questions pertain to your hunting experiences in New York during the 2004-2005 season. If you hunted different types of waterfowl, different habitats, or used different techniques on any one day, consider the type of activity you did most of the time. For example, you may have set up duck decoys in a marsh, but you would have taken a goose if you had the opportunity; count that as 1 day duck hunting and 0 days goose hunting.

5. How many days did you hunt specifically for diving ducks, dabbling ducks, or geese in New York during the 2004-2005 hunting season? (If none, write in 0.)

Diving ducks (Scaup, Goldeneye, Redheads, etc.)	___ days
Dabbling ducks (Mallards, Wood ducks, Teal, etc.)	___ days
Geese (Canada geese, Snow geese, Brant)	___ days

6. How many days did you hunt in each of the following habitat types in New York during the 2004-2005 hunting season? (If none, write in 0.)

Shallow water marsh, beaver pond, or small river	___ days
Ocean, large river (e.g., Hudson, Niagara), or large lake	___ days
Agricultural fields	___ days

7. How many days did you mainly use one of the following hunting techniques in New York during the 2004-2005 hunting season? (If none, write in 0.)

Jump shooting (flushing waterfowl by walking or floating up to them)	___ days
Pass shooting (shooting at waterfowl flying overhead that you did not flush or call in with decoys)	___ days
Calling waterfowl into decoys	___ days

8. How many days did you hunt on each of the following types of property in New York during the 2004-2005 hunting season? (If none, write in 0.)

Public land (federal refuge, state management area, county park, etc.) where access was <u>not</u> restricted in any way	___ days
Public land were access was restricted	___ days
Private land for free	___ days
Private land where you paid a fee (leased land, shooting preserve, waterfowl hunting club)	___ days

9. How many days did you hunt with a commercial waterfowl hunting guide in New York during the 2004-2005 hunting season? (If none, write in 0.)

___ days

10. Did you participate in a Youth Waterfowl Hunting Weekend in 2004, either as an adult sponsor or as a youth participant? (Check one response below.)

___ Did not participate ___ Youth participant ___ Adult sponsor

11. For the most recent year you hunted ducks, how often did you use a motorized spinning-wing decoy? (Check one choice only.) [Same as national survey]

___ Always ___ Sometimes ___ Never

Preferences for Season Dates

Think about the one Zone where season dates are most important to you. For example, a hunter might hunt the most days in the Western Zone, but season dates are more important to the hunter in the Northeastern Zone for some reason.

12. In which one Zone are season dates most important to you? (Check one choice.)

___ Long Island Zone
___ Lake Champlain Zone
___ Northeastern Zone
___ Southeastern Zone
___ Western Zone

13. For the one Zone you checked in the previous question, how preferable is it to you to be able to hunt ducks during each of the following weeks? (Circle one number for each time period.)

	How preferable is it to have duck season open during this time?				
Time periods when season could be open	Extremely preferable	Very preferable	Moderately preferable	Slightly preferable	Not at all preferable
1st week in October	1	2	3	4	5
2nd week in October	1	2	3	4	5
3rd week in October	1	2	3	4	5
4th week in October	1	2	3	4	5
1st week in November	1	2	3	4	5
2nd week in November	1	2	3	4	5
3rd week in November	1	2	3	4	5
Thanksgiving Day	1	2	3	4	5
1st week in December	1	2	3	4	5
2nd week in December	1	2	3	4	5
3rd week in December	1	2	3	4	5
Christmas Day	1	2	3	4	5
1st week in January	1	2	3	4	5
2nd week in January	1	2	3	4	5
3rd week in January	1	2	3	4	5
4th week in January	1	2	3	4	5

14. How important is each of the following possible reasons for <u>your</u> preference about when the duck hunting season should be open? (Circle one number for each possible reason.)

Possible reasons for your preference	Level of importance: Extremely important	Very important	Moderately important	Slightly important	Not at all important
When I have time to hunt	1	2	3	4	5
Total number of ducks I think will be around	1	2	3	4	5
Best chance to take my favorite kinds of ducks	1	2	3	4	5
Least chance of interference from other hunters	1	2	3	4	5
Least chance of interference from non-hunting public	1	2	3	4	5
When enough other hunters will keep ducks moving around	1	2	3	4	5
Possible conflicts with other hunting seasons	1	2	3	4	5
When the weather will be best for hunting ducks	1	2	3	4	5

15. Would you prefer to have <u>opening day</u> be on a weekday (but not a holiday) or a weekend? (Mark only one choice.)

___ Non-holiday weekday ___ Weekend

16. How important is each of the following possible reasons in considering your preference for whether opening day is a weekday or a weekend? (Circle one number for each possible reason.)

Possible reasons for your preference	Level of importance: Extremely important	Very important	Moderately important	Slightly important	Not at all important
Least chance of interference from other hunters	1	2	3	4	5
Enough other hunters will keep ducks moving around	1	2	3	4	5
Least chance of interference from non-hunting public	1	2	3	4	5
More convenient due to my work schedule	1	2	3	4	5
More convenient due to family obligations	1	2	3	4	5
Easier to get access to my favorite spots	1	2	3	4	5

Characteristics of decision making process for determining season dates

Since 1997, DEC has used Waterfowl Hunter Task Forces to get specific recommendations for duck hunting season dates in the Northeastern, Southeastern, and Western Zones because hunter preferences vary widely in those zones. The task forces have helped DEC establish season dates that provide equitable duck hunting opportunities for the various interests in each zone. Task force members act as representatives of all duck hunters in each zone, and they meet in spring to recommend a season for the coming year that best satisfies the diverse interests.

17. Were you aware that DEC has been using task forces to get specific recommendations for season dates in these 3 zones?

___ No (Go to question 19.)
___ Yes (Continue with question 18).

18. How often have <u>you provided</u> input to one of these task forces? (Check one choice only.)

___ Never ___ 1-3 years ___ 4-6 years ___ 7+ years

19. What should be the characteristics of task force members? For each pair of characteristics below (A and B), circle <u>one</u> number that most closely reflects what you prefer for the representatives. Circle "1" if you prefer ONLY A, circle "2" if you prefer mostly A but some B, circle "3" if you prefer equal amounts of A and B, circle "4" if you prefer mostly B and some A, and circle "5" if you prefer ONLY B.

Type A	ONLY A		Equal A and B		ONLY B	Type B
DEC duck biologists	1	2	3	4	5	Hunter representatives
Casual duck hunters	1	2	3	4	5	Avid duck hunters
Lots of duck-hunting experience	1	2	3	4	5	Little duck-hunting experience
Equal age distribution among representatives	1	2	3	4	5	Reflect age distribution of duck hunters (mostly older)
Members of waterfowl associations	1	2	3	4	5	Not members of waterfowl associations
Hunters who express interest	1	2	3	4	5	People DEC chooses based on professional experience

20. How should task force members get input for making decisions about season dates? For each possible method listed below that representatives might get input, circle one number to indicate your level of preference for that method.

Method for getting input to consider	Do you prefer this method? Definitely yes	Probably yes	Maybe yes	Maybe no	Probably no	Definitely no
Task force members should base decisions on their own experience	1	2	3	4	5	6
Task force members should ask their hunting friends	1	2	3	4	5	6
Individual hunters should be able to phone task force members	1	2	3	4	5	6
Each task force should have a P.O. box where hunters can send written input	1	2	3	4	5	6
Each task force should have an e-mail address for hunters to use	1	2	3	4	5	6
Individual hunters should be able to attend task force meetings	1	2	3	4	5	6
Each task force should set up and monitor a chat room for hunters on a web site	1	2	3	4	5	6

21. What kinds of things should representatives consider when making decisions about season dates? For each item listed below, circle one number to indicate your level of preference for that consideration.

Possible item to consider	Should this be a consideration in decisions about season dates? Definitely yes	Probably yes	Maybe yes	Maybe no	Probably no	Definitely no
Possible conflicts with other hunting seasons	1	2	3	4	5	6
When the greatest number of hunters want the season open	1	2	3	4	5	6
When specialized hunters want the season open so they can hunt the big water when its really cold	1	2	3	4	5	6
When the most youth can probably hunt	1	2	3	4	5	6
Possible conflicts with family obligations around the holidays	1	2	3	4	5	6
When ducks are most abundant	1	2	3	4	5	6
When the greatest variety of ducks are around	1	2	3	4	5	6

INFORMATION ABOUT YOU

22. How important is duck hunting to you? (Check one choice only.)
[Same as national survey]

___ It's my most important recreational activity
___ It's one of my most important recreational activities
___ It's no more important than my other recreational activities
___ It's one of my least important recreational activities

23. Are you . . .? *(Circle one number.)* 1. Female 2. Male

24. How would you describe the type of area where you live?

_____ on a farm
_____ a rural area, but not a farm
_____ village or city with fewer than 25,000 people
_____ city with 25,000 to 49,999 people
_____ city with more than 50,000 people

25. What is the highest level of education you have attained? (*Check one line.*)

___ Primary school
___ High school or GED
___ Some college
___ College graduate (B.A., B.S.)
___ Postgraduate degree (M.S., PhD)
___ Professional degree (MD JD)

THANK YOU VERY MUCH FOR YOUR ASSISTANCE

To return this questionnaire, simply seal it with the white reusable seal (postage has been provided) and drop it in the nearest mailbox.

APPENDIX B: HYPOTHETICAL EXPLANATION OF HOW TIMING OF SEASON DATES COULD AFFECT DUCK HUNTERS' EXPERIENCES.

For duck harvest to occur, a series of sequential interactions between ducks and hunters must happen beginning with hunters seeing ducks/flocks (Figure B1). Some of those ducks/flocks must be in-range, hunters must shoot at some of those in-range ducks, and must harvest some of those ducks when shots are fired. One explicit effect of this sequence of interactions is that the initial number of ducks in the area will be reduced by the number of ducks harvested.

Timing of the hunting season (i.e., season dates) could influence this sequence of hunter-duck interactions in several ways. First, duck abundance and diversity likely would differ depending on when the season was open relative to fall migration. Second, assuming hunters' preferences for season dates reflect their intention to hunt, timing of the season could influence the number of hunters afield. How much influence is unknown, however, because some proportion of hunters undoubtedly hunt even when the season is open when they least prefer.

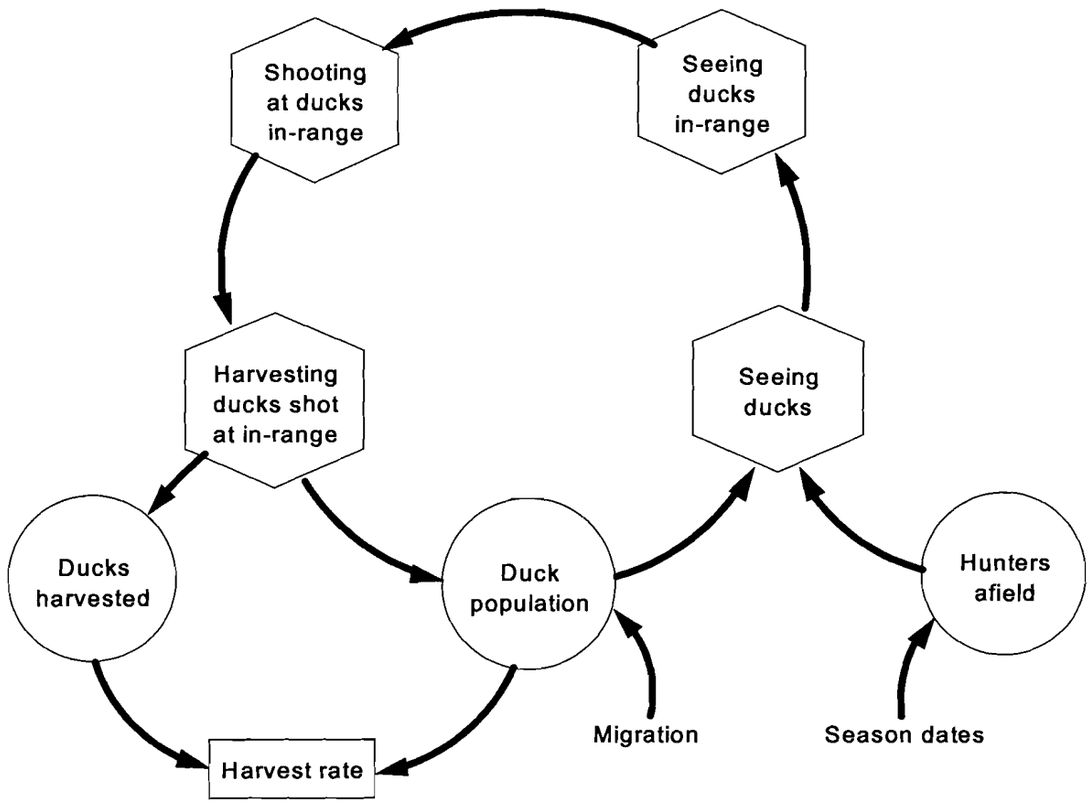

Figure B1. Conceptual model of a dynamic system with ecological and human dimensions, showing that duck harvest results from a sequential series of interactions between hunters and ducks. Adapted from Enck and Ringleman (2006).

As described above and reflected in Figure B1, decision-makers could benefit by exploring these reasons why hunters might prefer certain season dates:

- when ducks are most abundant
- when hunters' favorite species of ducks are most available
- when it is most convenient for hunters to go afield (i.e., when they have time to hunt)

If hunters indicate any of these are important reasons why they prefer particular season dates, their preferences would reflect a desire to increase particular hunter-duck interactions as shown in the main loop in Figure B1. However, these reasons for preferences about season dates leave unresolved which interactions/effects in Figure B1 are most important to hunters, and thus which might be impacts to be managed from the perspective of hunters (i.e., as fundamental objectives of duck management).

Additional insight could be gained by examining other possible reasons for preferences; for example, reasons linked conceptually to hunter-hunter interactions. One of these is hunters hearing shots being taken at ducks by other hunters. The effects of these shots might be interpreted as either positive or negative depending on the intensity of shooting (Figure B2). Low-intensity shooting moves ducks around, increasing the probability that hunters will see (i.e., interact with) more ducks, whereas higher-intensity shooting has the effect of disturbing ducks so much that they leave the area (Evans and Day 2002). These phenomena are well-known to managers, and provide the basis for half-day hunting, non-hunting days, and no-hunting refuges for waterfowl on public hunting areas (e.g., Madson and Fox 1995).

Because the hunter-hunter interaction of hearing shots fired at waterfowl can have multiple effects, hunters could interpret these effects as good (if ducks are moved around and their observability increased) or bad (if ducks are pushed out of the area and duck abundance is diminished). Preferences for season dates (and especially whether opening day is on a weekday or a weekend) might reflect when hunters think these counter-acting effects will be "balanced." That is, hunters may prefer to have the season open when they believe there will be enough hunters to keep ducks moving around, but not so many as to disturb ducks out of the area.

Similarly, preferences for season dates also might reflect a desire to minimize other types of hunter-hunter interactions that hunters associate with negative effects, such as crowding or interference. Enck and Decker (1990) reported that some duck hunters prefer to hunt on private land to minimize contacts with "unethical hunters" who either intercept (e.g., by calling) or cause to flare (e.g., by shooting at) ducks that might have decoyed to them. Interactions in which ducks are intercepted or flared have the dual effects of increasing both the actual distance to observed ducks, and the distance hunters consider to be in-range and at which they are willing to shoot at ducks (Figure B3), These effects reflect the well-known, unethical behavior of sky-busting (e.g., Kuentzel 1994, Kuentzel and Heberlein 1998).

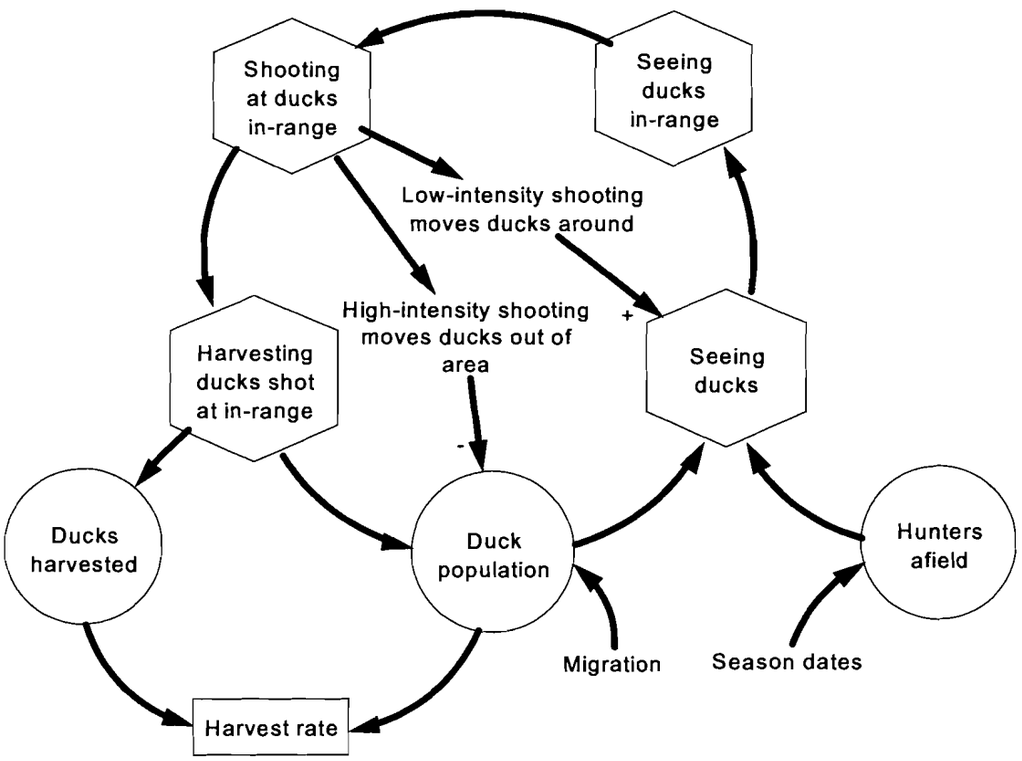

Figure B2. Conceptual model showing that shooting at ducks by hunters "feeds-back on" a dynamic system of hunter-duck interactions in two ways, depending on the intensity of shooting. Adapted from Enck and Ringleman (2006).

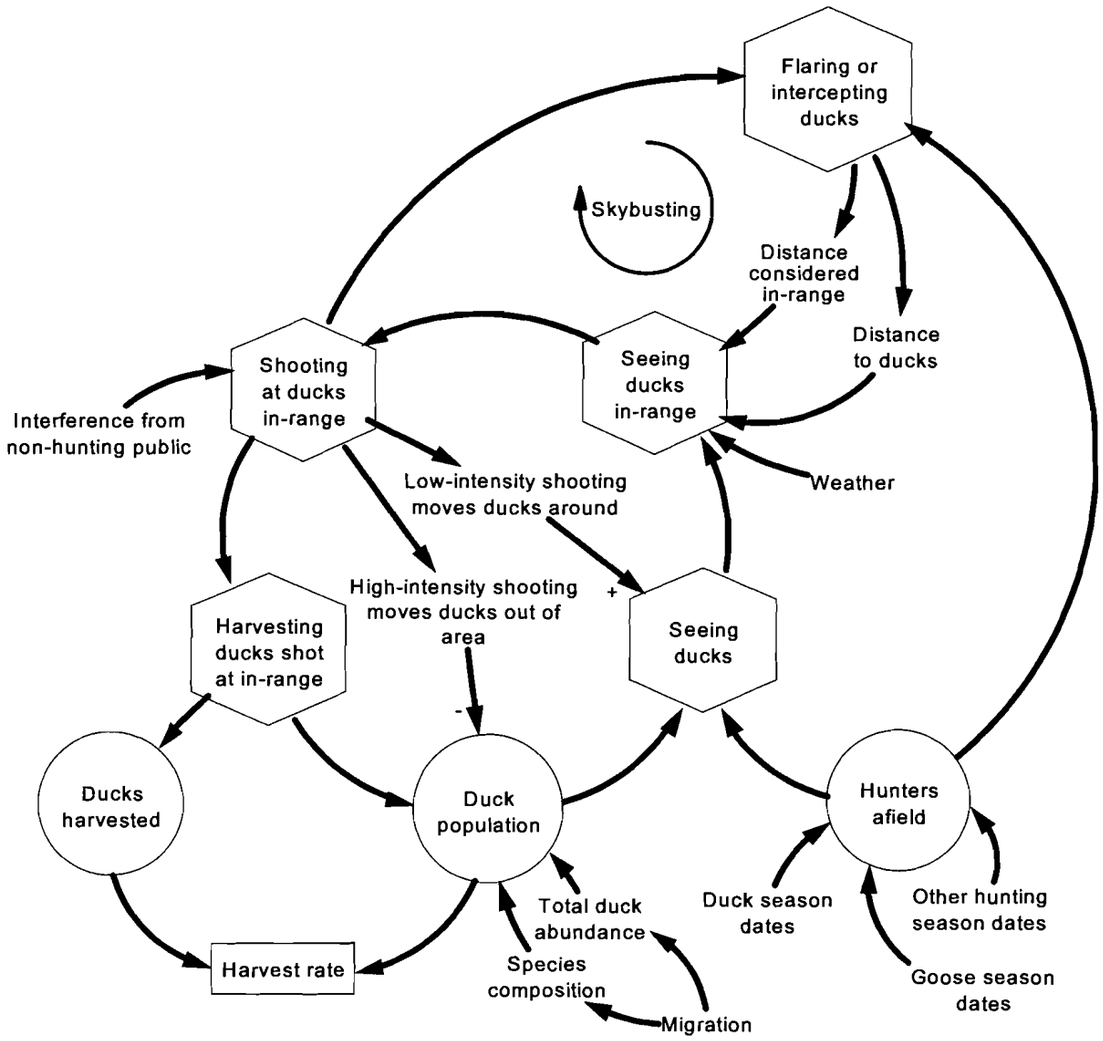

Figure B3. Conceptual model showing that as more hunters take more shots at ducks, one effect can be that ducks flare from decoys or are intercepted, increasing the actual distance to those ducks. Hunters respond to this by increasing the distance they consider in-range for shooting, in an effort to maintain an expected, minimum proportion of interactions with ducks that are in-range. This feedback loop describes the phenomenon of sky-busting. Adapted from Enck and Ringleman (2006).

The addition of shooting intensity (Figure B2) and sky-busting (Figure B3) feed-back loops to the conceptual model suggest utility in exploring these additional, potential reasons why hunters might prefer particular season dates:

- when enough other hunters will be moving ducks around
- when there is the least chance of interference from other hunters

Preferences for these reasons would reflect hunters' desires to change the occurrence of hunter-duck interactions, in the first case, and hunter-hunter interactions in the second.

Important insights could be gained by also exploring these additional potential reasons why hunters' prefer some dates over others:

- when hunting seasons for other game species (e.g., small game, deer) are open
- when the goose season is open
- when there is less of a chance for interference from the non-hunting public
- when the weather is best for hunting ducks

The first bullet above reflects previous research in New York showing that conflicts with seasons for other game species decrease participation by less avid duck hunters (Enck and Decker 1990). The second bullet reflects data from the same study showing some "duck" hunters primarily hunt for geese on days when duck and goose seasons are open concurrently. The third bulleted reason above stems from hunters' reports to DEC in recent years about conflicts usually early in the season on larger lakes and rivers where hunters shoot over the water legally but relatively near to homes occupied by non-hunters. The fourth reason above reflects task force discussions about some hunters preferring to hunt early in the season before their favorite waters "freeze-up." Others prefer to hunt later in the season when diving-duck species are more available, and when they believe fewer other hunters will be around to interfere with their hunting.

Some benefits of clarifying with stakeholders the impacts to be managed, and linking those impacts to interactions and effects through conceptual models, have been identified recently in New York in the context of managing and black bears (*Ursus americanus* [New York State Department of Environmental Conservation 2003]) and white-tailed deer (*Odocoileus virginianus* [Enck et al. 2003]). In both cases biologists first identified impacts to be managed using input from groups of stakeholders. Then they developed models of the system of factors that might influence those impacts, including hypotheses about feedback mechanisms in the models. Bear biologists used their model to simulate the effects of additional field staff, public education efforts, and bear hunting on the relative number of complaints the agency receives from the public about negative interactions with bears in residential areas (Siemer and Otto 2005). Deer biologists discussed the mental models with private landowners and hunters to articulate and evaluate stakeholders' assumptions about factors affecting their own perceptions and behaviors, and to develop innovative ideas about what actions might best achieve desirable or tolerable levels of impacts.

In addition to the conceptual fuzziness about the impacts that duck hunters might want managed at desirable (for positive impacts) or tolerable (for negative impacts) levels, is *structural uncertainty* (Williams 1997) about the relationships and feed-back loops in the model. For example, do preferences for season dates that are based on "having enough hunters to keep ducks moving around" reflect positive impacts like "being connected to nature through duck observations"

(connectedness to nature), or perhaps "feeling that their hunting efforts are worthwhile" (worthwhile), or do those preferences reflect the positive impacts of "harvest sufficiency" or perhaps "expertness as a duck harvester" (Figure B4)? Do preferences for season dates that are based on having the "least chance of interference from other hunters" reflect the negative impact of "having my chance for harvest reduced" or do they reflect the negative impact of "ducks are being shot in the wrong way."

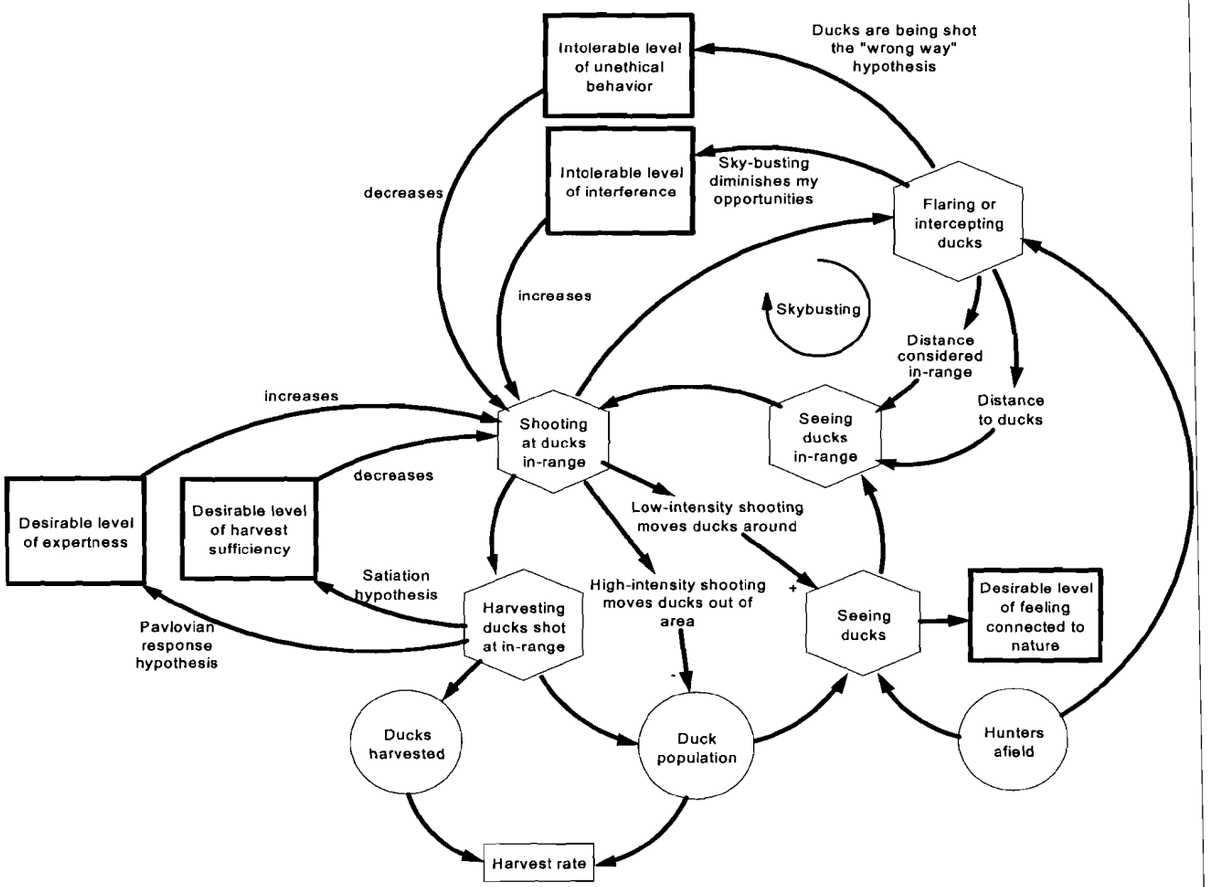

Figure B4. Conceptual model showing that hunter-duck and hunter-hunter interactions that are part of a dynamic duck management system have associated with them several possible impacts to be managed (in squares), and that the levels of these impacts could feed-back on the system as either reinforcing or counter-balancing loops.